



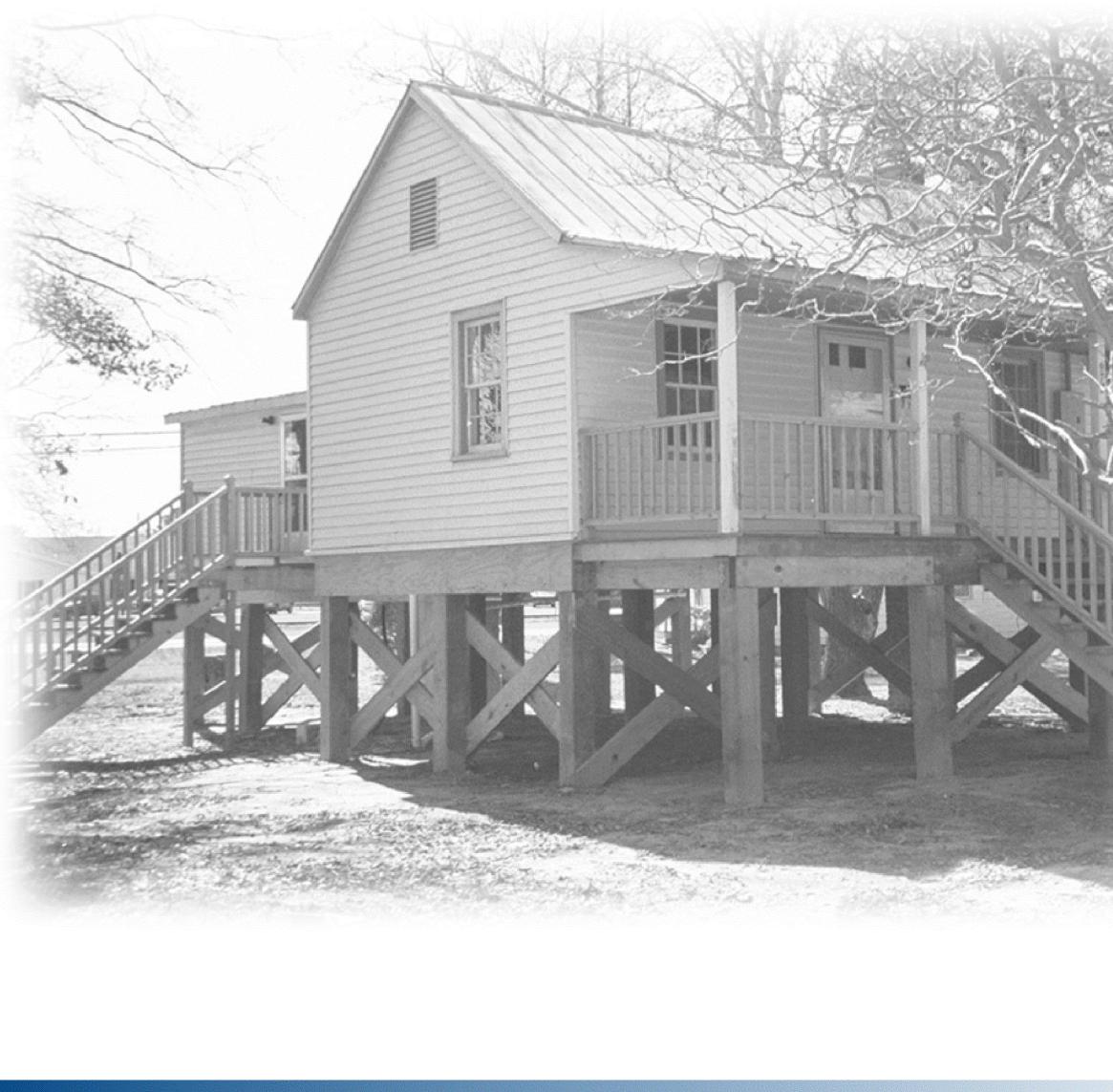
INTERNATIONAL  
CODE COUNCIL™

May 2000

# Reducing Flood Losses Through the *International Code Series:* Meeting the Requirements of the National Flood Insurance Program



American Society of Civil Engineers



# **Reducing Flood Losses Through the *International Code Series:***

## **Meeting the Requirements of the National Flood Insurance Program**

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**May 2000**

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***This guide is based on the 2000 editions of the I-Codes™***



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# **Executive Summary**

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For more than 25 years, most local jurisdictions have participated in the National Flood Insurance Program (NFIP) by adopting and enforcing floodplain management ordinances or regulations. The NFIP was created as a partnership. The federal government makes NFIP flood insurance and other federal assistance available to residents and businesses, and communities agree to regulate mapped flood hazard areas to reduce future flood damage.

With the publication of the *International Building Code*<sup>®</sup>, the *International Residential Code*<sup>™</sup>, and the rest of the *International Code Series* (I-Codes<sup>™</sup>), the opportunity exists for communities to integrate building safety and floodplain management. This guide, *Reducing Flood Losses Through the International Code Series: Meeting the Requirements of the National Flood Insurance Program*, will help communities decide how best to accomplish that integration in order to initiate or continue participation in the National Flood Insurance Program.

The 2000 editions of the I-Codes<sup>™</sup> contain provisions that meet the minimum flood resistant design and construction requirements of the NFIP. These provisions stem from cooperative efforts among the Federal Emergency Management Agency (FEMA), the American Society of Civil Engineers (ASCE), and other individuals and organizations. These efforts began in 1991 with the development of flood load provisions. Those load provisions became part of ASCE 7 in 1995, and were expanded in ASCE 7-98. The cooperative efforts continued with the development of ASCE 24-98, a standard for minimum requirements for flood-resistant design and construction of buildings and structures in flood hazard areas. Finally, FEMA and ASCE proposed inclusion of flood-resistant provisions in the 2000 editions of the IBC<sup>®</sup> and IRC<sup>™</sup>.

**Chapter 1** presents a brief overview of the NFIP, including the benefits of participation and the implications of choosing not to participate. The NFIP is a voluntary program, but its benefits are far-reaching. Responsibilities of participating communities extend beyond issuance of building permits, and include administrative and map-related functions. Technical assistance and support are available from NFIP State Coordinating Agencies and FEMA regional offices.

**Chapter 2** outlines some broad approaches to managing flood hazard areas. As illustrated in Figure 1 (Section 2.5), integrating a community's approach with the I-Codes™ involves careful consideration and planning to reduce overlap of regulations, duplication of effort, and conflicts. Two worksheets (pages 2-8 and 2-9) are included to help communities assess how their current approaches to regulating development in flood hazard areas and building permits compare with the NFIP requirements. Also, a review process is outlined on another worksheet (page 2-10) to facilitate decisions about appropriate modifications to processes and regulations.

**Chapter 3** is a collection of topics on the implications of adopting the I-Codes™ for participation in the NFIP:

- *Section 3.1* reviews the NFIP definition of “development” because the NFIP requires that communities regulate all development in flood hazard areas, not just buildings and structures.
- *Section 3.2* summarizes how the utility-related I-Codes™ address provisions to protect building support utility systems.
- *Section 3.3* briefly outlines the NFIP’s Community Rating System, which provides discounts on the cost of flood insurance within communities that adopt regulations that exceed the minimum requirements of the NFIP.
- *Section 3.4* offers explanations and sample building code text amendments for consideration by communities that may elect to adopt certain standards that are higher than the minimum requirements of the NFIP.
- *Section 3.5* summarizes the NFIP requirements pertaining to existing buildings, specifically, how substantial improvements and repair of substantial damage are to be handled.
- *Section 3.6* is a brief explanation of a part of the standard coverage provided by NFIP flood insurance. Under specific circumstances, notably if a flood causes substantial damage, this coverage provides the owner an additional payment towards the cost of bringing the building into compliance with the flood resistant provisions.

**Chapter 4** outlines certain responsibilities that communities assume when they participate in the NFIP. While many responsibilities are incorporated into the I-Codes™, a number of others should be reviewed to make sure that they are assigned.

# Acknowledgments

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# 1. Introduction

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## 1.1 Purpose of This Guide

This guide is intended to help community officials decide how to integrate the *International Codes* into their current floodplain development and regulatory processes in order to meet the requirements to participate in the National Flood Insurance Program (NFIP). It is not intended as an endorsement of any specific approach for achieving effective management of flood hazards, nor does it explain the NFIP requirements and how to administer them. References and online resources are listed in Appendix A.

## 1.2 The I-Codes<sup>TM</sup> and the NFIP

This guide covers the family of codes known as the *International Codes* (I-Codes<sup>TM</sup>) that were developed under the auspices of the International Code Council (ICC<sup>®</sup>). Each code in the series either meets or exceeds the minimum requirements of the NFIP with respect to the scope of each code:

- The *2000 International Building Code*<sup>®</sup> (IBC<sup>®</sup>) meets the minimum design and construction requirements of the NFIP for all buildings and structures, including, by reference, one- and two-family dwellings. Appendix G addresses other NFIP requirements such as map-related duties, subdivisions, site work, manufactured homes, recreational vehicles, and variances.
- The *2000 International Residential Code*<sup>TM</sup> (IRC<sup>TM</sup>) meets the minimum requirements for flood resistant design and construction of one- and two-family dwellings.
- The *2000 International Plumbing Code*<sup>®</sup> meets the minimum requirements for flood resistant design and construction of plumbing systems.
- The *2000 International Mechanical Code*<sup>®</sup> meets the minimum requirements for flood resistant design and construction of mechanical systems.
- The *2000 International Fuel Gas Code*<sup>®</sup> meets the minimum requirements for flood resistant design and construction of fuel gas systems.
- The *2000 International Private Sewage Disposal Code*<sup>®</sup> meets the minimum requirements for flood resistant design and construction of private sewage disposal systems.

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When the IBC<sup>®</sup> is adopted, the IRC<sup>TM</sup> is adopted by reference. If a state or community chooses not to regulate one- and two-family dwellings through the IRC<sup>TM</sup>, it must specifically exclude the IRC<sup>TM</sup> in its Ordinance for Adoption. In this case, for the purpose of NFIP participation, the activities regulated by the IRC<sup>TM</sup> must be covered elsewhere in a floodplain management ordinance or regulation. (See Table 1 and Section 2.5.)

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Table 1 (page 1-13) lists key provisions of the NFIP that pertain to buildings. These provisions are cross-referenced to specific sections of the codes, related standards, and NFIP resource documents. Appendices B and C contain crosswalks of the complete text of the NFIP regulations and the pertinent sections from the IBC® and IRC™, respectively.

### **1.3 Intended Audience**

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For the purposes of the NFIP and this guide, the term “community” means “any State or area or political subdivision thereof, or any Indian tribe or authorized tribal organization, or Alaska Native Village or authorized native organization, which has the authority to adopt and enforce floodplain management regulations for the areas within its jurisdiction.” Counties, cities, towns, and parishes are communities. In some states, flood control districts or planning districts may meet the definition if they have land use authority.

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This guide is intended for officials of any unit of government who are responsible for regulating land development and building processes. It is designed specifically to help those whose agencies are responsible for regulating floodplain development and those who administer building codes. These responsibilities may be under the jurisdiction of a single agency or distributed among several agencies. Regardless of how your community is organized, it is recommended that this guide be reviewed by every agency that has a role in land development and construction regulation.

### **1.4 Where to Get Help**

Each state has an office that is designated as the State Coordinating Agency for the National Flood Insurance Program, commonly referred to as the “NFIP State Coordinator.” Information on how to contact the NFIP State Coordinators and a list of FEMA’s ten regional offices are included in Appendix D.

FEMA and others have produced numerous documents and publications related to the NFIP and regulation of flood hazard areas. Reference and resource materials, including cited publications and online resources, are listed in Appendix A.

### **1.5 Purpose and Overview of the National Flood Insurance Program**

**NFIP Purpose.** The original authorizing legislation for the NFIP was passed in 1968. Congress expressly found that “a program of flood insurance can promote the public interest by encouraging sound land use by minimizing exposure of property to flood losses. . . ”

The NFIP is intended to encourage states and local governments to recognize and incorporate flood hazards in land use and development decisions. In some communities this is achieved by guiding development to

areas with lower risk. When decisions result in development within flood hazard areas, application of the criteria set forth in federal regulation at 44 CFR §60.3 is intended to minimize exposure and flood-related damage.

***Overview of the National Flood Insurance Program.*** The National Flood Insurance Program is administered by the Federal Emergency Management Agency and has three main elements:

1. *Hazard identification and mapping*, under which engineering studies are conducted and flood maps are prepared to delineate areas that are predicted to be subject to flooding under certain conditions;
2. *Floodplain management criteria for development*, which establish the minimum requirements for communities to apply to development within mapped flood hazard areas with the intent of recognizing hazards in the entire land development process; and
3. *Flood insurance*, which provides financial protection for property owners to cover flood-related damage to buildings and contents.

Federal flood insurance is designed to provide an alternative to disaster assistance and disaster loans for home and business owners. Disaster assistance rarely comes close to covering all of the costs to repair and clean up. While available to qualified victims, disaster loans do not significantly ease the financial burden due to repayment terms. It is important to remember that disaster assistance is available only after floods have been declared major disasters by the president of the United States. Disaster loans are available after major disasters and when the U.S. Small Business Administration determines that an event has affected a certain number of uninsured homes and businesses. In contrast, NFIP flood insurance claims will be paid any time damage from a qualifying flood event occurs.

Another important objective of the NFIP is to break the cycle of flood damage. Many buildings have been flooded, repaired or rebuilt, and flooded again. Before the NFIP, in some parts of the country this cycle occurred every couple of years, with people rebuilding in the same flood-prone areas and using the same construction techniques that did not adequately resist flood damage.

By encouraging communities to guide development to lower risk areas, and by requiring elevation of new buildings and non-conforming buildings that sustain major damage, one of the long-term objectives of the NFIP can be achieved: *Create disaster resistant communities*. Older

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If your community does not currently participate in the National Flood Insurance Program, you are strongly urged to join. To do so, contact either your NFIP State Coordinator or your FEMA Regional Office listed in Appendix D.

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buildings may be removed or replaced, or they may be upgraded or modified with techniques that lead to little or no flood damage. Through the land development process, developers can often be required or encouraged to keep new development out of high risk areas.

## **1.6 Overview of Community and State Responsibilities Under the NFIP**

*Overview of Community Responsibilities.* NFIP regulations (44 CFR §59.22) outline actions to be taken by a community to become and remain eligible to participate in the NFIP. A community agrees to take certain actions, including:

- Adopting and enforcing floodplain management regulations that either meet or exceed the minimum standards of the NFIP.
- Applying the regulations to all designated flood hazard areas throughout its jurisdiction.
- Submitting to FEMA the regulations (and subsequent amendments thereto), including copies of related zoning, building, and subdivision regulations, health codes, special purpose ordinances, and other corrective and preventive measures enacted to reduce or prevent flood-related damage.
- Submitting to FEMA certain estimates relating to the community as a whole and to the flood hazard area, including population, number of residences, number of small businesses, and number of other structures.
- Responding to FEMA's periodic request for information on the community, including the number of permits and variances that may have been issued for development in the flood hazard area.
- Identifying the location where flood hazard maps will be maintained and available for public inspection.
- Appointing or designating an agency or individual official with the responsibility for the floodplain management program.
- Maintaining a file with specific information on all development that occurs within the mapped flood hazard area, including Elevation Certificates and Floodproofing Certificates, and making this information available for public inspection.
- Conducting periodic field inspections to ensure that on-going development complies with issued permits and to check for unpermitted development.
- Having objectives in the comprehensive plan that are consistent with floodplain management goals.

- Notifying FEMA when revisions to the flood hazard maps are necessary and providing available data to support those revisions.
- Cooperating with federal, state, local, and private entities that undertake to study, survey, identify, and map flood hazard areas.
- Notifying FEMA, the state, and adjacent communities of any alteration or relocation of a watercourse.
- Notifying FEMA when the community's boundaries have been modified by such legal actions as annexation.

***Overview of State Responsibilities.*** Most states have agreed to coordinate the NFIP with their communities and have designated an agency that is responsible for those functions (Appendix D). The NFIP State Coordinator's Office is specifically charged with being a link between FEMA and communities and can advise communities on how to comply with the NFIP requirements as well as any applicable state laws and regulations. The NFIP State Coordinator stays current on NFIP issues and can advise communities as to how specific provisions have been interpreted in many situations.

The duties and responsibilities of the NFIP State Coordinator's Office are set forth in the NFIP regulations at 44 CFR §60.25, and include:

- Enacting, if necessary, legislation that enables communities to regulate development in designated flood hazard areas.
- Encouraging and assisting communities to qualify for participation in the NFIP.
- Guiding and assisting communities in developing, implementing, and maintaining floodplain management regulations.
- Providing communities and the general public with NFIP information.
- Assisting communities in disseminating information about flood hazard areas and floodplain management requirements.
- Assisting in the delineation of flood hazard areas when possible, and providing technical information to FEMA.
- Recommending priorities for federal activities relative to community needs.
- Notifying FEMA of problems with community regulations if such problems cannot be resolved between the state and the community.
- Establishing minimum floodplain management standards for state activities.

- Coordinating floodplain management activities with other state, regional, and local planning and enforcement agencies.
- Assisting in the identification and implementation of mitigation recommendations.
- Participating in training opportunities and preparedness programs.

Other ways that some NFIP State Coordinators may support communities include:

- Providing advice on improvements to local administrative procedures for issuing permits, handling variances, inspecting construction, and remedying violations.
- Producing a floodplain management newsletter.
- Reviewing proposed code and ordinance amendments to ensure NFIP compliance.
- Explaining ways to use flood hazard maps, including how to seek revisions.
- Assisting communities with applications to participate in the Community Rating System.
- Conducting training workshops on all aspects of the NFIP and floodplain management.
- Performing on-site technical assistance visits.
- Providing reports on community compliance to FEMA.
- Developing a program of certification for floodplain managers.

## **1.7 Benefits of Participating in the NFIP**

While there is no federal requirement that communities participate in the NFIP, most communities choose to do so to make flood insurance available to their citizens. In addition, federal assistance for acquisition or construction of buildings in flood hazard areas is not available in non-participating communities. To participate, a community agrees to adopt, administer, and enforce provisions that either meet or exceed the minimum floodplain management requirements set forth in federal regulations.

If your community does not presently participate in the National Flood Insurance Program, you are strongly urged to join. To do so, contact either your NFIP State Coordinator or the FEMA Regional Office that supports your state (Appendix D).

There are four significant benefits of participating in the NFIP. One focuses on property protection and three focus on financial security. Specifically:

1. Development that complies with the minimum NFIP performance criteria is less likely to experience major damage. Studies have shown that, on average, buildings that meet the NFIP criteria sustain approximately 75 percent less damage than those that do not.
2. Federally insured or regulated lenders must require that improvements located in mapped flood hazard areas be insured for flood damage. If a community does not participate in the NFIP, then lenders must notify borrowers that federal disaster assistance for flood damage will not be available, including grants and loans.
3. People who have flood insurance have a significant advantage over those who have no financial support or those who have to get loans to help repair and rebuild. Most homeowners' property insurance explicitly excludes damage from floods, and non-NFIP flood insurance is hard to find. However, it is easy for most home and business owners to get NFIP flood insurance because many private companies write and sell policies on behalf of the NFIP.
4. Federal disaster assistance is available to repair or restore public infrastructure and public buildings in flood hazard areas if damaged by a disaster that is declared by the president.

In participating communities, NFIP flood insurance is available for both residential and non-residential buildings, and additional coverage is available for contents. Policies on buildings in flood hazard areas shown on Flood Insurance Rate Maps (FIRMs) include coverage that provides a claim payment to help defray the cost of bringing a flood-damaged building into compliance with community floodplain management requirements. Called "Increased Cost of Compliance," this additional coverage is described in Section 3.6. The amount of this coverage is stated in the flood insurance policy documents.

## **1.8 Implications of Not Participating in the NFIP**

Communities that have been provided a Flood Insurance Rate Map (FIRM) by FEMA may elect not to participate in the NFIP. The following apply to non-participating communities:

- NFIP flood insurance is not available.
- Federal agencies cannot provide grants and loans for construction, reconstruction, repair, rehabilitation, or additions to buildings in mapped special flood hazard areas (SFHAs), including such agencies

as the U.S. Department of Housing and Urban Development (HUD), the U.S. Environmental Protection Agency (EPA), the U.S. Small Business Administration (SBA), and the U.S. Department of Health and Human Services.

- Federal disaster assistance will not be provided in identified flood hazard areas for permanent restorative construction. This means that public buildings damaged by flooding are not eligible for federal disaster assistance.
- Individuals and families will receive only limited federal disaster housing assistance when a major disaster is declared. Federal grants and assistance for repairs are not available.
- Direct federal loans to residents and developers for properties in flood hazard areas are not available from government programs such as the Department of Veterans Affairs (VA) and the Federal Housing Administration (FHA).
- Other regulated mortgage lenders may make loans for properties in flood hazard areas, but they are required to notify borrowers that federal disaster assistance will not be provided in the event of a flood disaster.

Communities that initially decline to participate may later decide to join the NFIP. Insurance on buildings that were constructed in flood hazard areas after the date of the FIRM will be rated based on the risk of flooding. If they were built below the Base Flood Elevation and are subject to damage, then flood insurance will be extremely expensive. The FIRM in effect at the time a building was constructed, and the applicable actuarial rates based on that map, apply regardless of when the community elects to join the NFIP.

## **1.9 FEMA's Involvement with Model Codes and Standards Producing Organizations**

Many communities that participate in the NFIP do so through single-purpose floodplain management ordinances. For the most part, these ordinances are administered in land planning offices, usually in coordination with the building permit office. In other cases, communities participate through various combinations of laws, ordinances, and regulations. Despite efforts to coordinate, occasional conflicts have been known to arise between the NFIP requirements and a community's building and other health and safety codes.

In the early 1990s, FEMA requested assistance from the National Institute of Building Sciences to examine 23 model building codes and standards, and to perform a detailed comparison with NFIP regulations, model building codes, consensus standards, and technical guidance documents. The work was supported by the following model codes and standards organizations:

- the Building Officials and Code Administrations International, Inc. (BOCA),
- the Southern Building Code Congress International, Inc. (SBCCI),
- the International Conference of Building Officials (ICBO),
- the National Fire Protection Association (NFPA), and
- the National Conference of States on Building Codes and Standards (NCSBCS).

The result of this cooperative effort was the *Code Compatibility Report*, published in three volumes in October 1992. The report outlined recommended changes to the codes and to various FEMA documents. As the three major code organizations made progress on the development of the *International Code Series*, FEMA executed an agreement with the Structural Engineering Institute of the American Society of Civil Engineers (ASCE). ASCE was tasked with monitoring progress and preparing proposed changes to the codes to improve consistency with the NFIP.

In the early 1990s, FEMA and ASCE's Structural Engineering Institute initiated work to develop one standard for flood loads and another for flood resistant design and construction. Although the NFIP had been in effect since 1968, and by 1990 nearly 19,000 counties and towns were participating, there were no consensus standards for determining flood loads or for flood resistant design and construction.

## **1.10 ASCE 7: Minimum Design Loads for Buildings and Other Structures**

In 1991, FEMA and ASCE organized a committee of nationally recognized experts in the fields of structural engineering, construction techniques, and building codes and regulations. The committee was tasked with developing flood load provisions to be inserted in ASCE 7. These provisions first appeared in ASCE 7-95. Additional revisions were made to the flood load provisions in ASCE 7-98, which also provides minimum requirements for determining flood loads and load combinations for

buildings and structures located in flood hazard areas, including new structures and substantial repair or improvement of existing structures that are not designated as historic structures.

To develop the flood load provisions, ASCE followed the consensus standards process, which includes balloting by a balanced standards committee, balloting by the membership of ASCE as a whole, and balloting by the public. The result, ASCE 7-98, is a referenced standard in the *2000 International Building Code*® and was used as a primary reference document in the development of the flood load provisions of the *2000 International Residential Code*™.

### **1.11 ASCE 24: Flood Resistant Design and Construction**

In 1995, ASCE organized a standards development committee of nearly 40 nationally recognized individuals in the fields of floodplain management, structural engineering, construction techniques, and building codes and regulations. The committee's work resulted in ASCE 24, which provides minimum requirements for flood resistant design and construction of buildings and structures located in flood hazard areas, including new structures and substantial repair or improvement of existing structures that are not designated as historic structures.

To develop the flood resistant design and construction standards, ASCE followed the consensus standards process, which includes balloting by a balanced standards committee, balloting by the membership of ASCE as a whole, and balloting by the public. The result, ASCE 24-98, is a referenced standard in the *2000 International Building Code*® and was used as a primary reference document in the development of the flood resistant design and construction provisions of the *2000 International Residential Code*™.

### **1.12 NES: Flood Resistance Evaluation Plan**

In 1999, the National Evaluation Service, Inc. (NES), with support from FEMA, convened an advisory committee to develop an evaluation plan for determining the flood resistance of materials entitled *Evaluation Plan for Determination of Flood-Resistance of Building Elements*. This protocol provides guidance for testing to evaluate building elements for the ability to resist the effects of floodwater exposure. It serves as a

starting point for manufacturers to determine whether their building products are suitable for use below flood levels. Building materials that may be evaluated include interior and exterior wall, floor, ceiling, and roof materials and finishes; structural elements; insulating materials; and windows, doors, vents, and other types of fixed or operable openings. The protocol addresses determining the physical and/or performance characteristics of the evaluation subject, exposure to simulated floodwater (fresh and saline), minimum drying times, and testing after exposure to establish changes in performance characteristics.

### **1.13 Flood Elevations: BFE and DFE**

The Base Flood Elevation (BFE), as used by the NFIP, is the elevation relative to the datum specified on the FIRM that is expected to be reached by a flood having a one-percent chance of being equaled or exceeded in any given year. Although the term is misleading, this flood is commonly called the “100-year flood.”

The I-Codes<sup>TM</sup>, ASCE 7, and ASCE 24 use the term “Design Flood Elevation” (DFE). The DFE is the elevation of the Design Flood, including wave height in coastal areas, relative to a specified datum. The DFE must equal or exceed the BFE in all cases.

A community may select a Design Flood that includes such factors as ultimate development runoff, a “no-rise” floodway, a lower frequency flood event, or lower wave height designation for areas subject to high velocity wave action. The Design Flood, from which the DFE is derived, is the flood associated with the greater of the following two areas:

1. The area flooded by one-percent annual chance flood (Base Flood), or
2. The area designated as the flood hazard area on a community’s flood hazard map.

There are circumstances where FIRMs do not specify BFEs:

- *Unnumbered flood hazard areas where engineering analyses have not been performed to develop detailed flood elevations.* In these areas, other sources for flood information should be consulted, including the state, the U.S. Army Corps of Engineers, and the Natural Resources Conservation Service. FEMA has prepared a guidance document that outlines simplified methods to approximate

the BFE, *Managing Floodplain Development in Approximate Zone A Areas: A Guide for Obtaining and Developing Base (100-Year) Flood Elevations* (FEMA 265).

- *AO zones where shallow overland or sheetflow is expected.* The flood elevation is designated as a depth number on the map, or if not designated, the flood elevation is to be at least two feet above the highest grade adjacent to the proposed building footprint.

**Table 1. Summary of selected key NFIP provisions, code citations, and reference documents.**

(See Appendices B and C for comprehensive crosswalks of the NFIP regulations to the IBC® and IRC™, respectively.)

Key Provisions of the NFIP	2000 IBC®	2000 IRC™	ASCE 24-98	Other Publications
<b>60.3(a)(3)(i)</b> new construction and substantial improvements to be designed and adequately anchored to prevent flotation, collapse, or lateral movement	<b>1605.2.2</b> and <b>1605.3.1.2</b> flood loads and load combinations (reference ASCE 7) <b>1612.4</b> design and construction (reference ASCE 24)	<b>R301.1</b> construction to support all loads, including flood loads <b>R327.1.1</b> structural systems designed, connected, and anchored	<b>Section 5.6</b> anchorage and connections to resist effects of vertical and lateral loads	ASCE 7-98, <i>Minimum Design Loads for Buildings and Other Structures</i>
<b>60.3(a)(3)(ii)</b> new construction and substantial improvements to be constructed with materials resistant to flood damage	<b>801.1.3</b> interior finishes, trim, and decorative materials to be in accordance with FEMA FIA-TB#2 <b>1403.7</b> exterior walls to be resistant to water damage	<b>R327.1.7</b> and <b>R501.3</b> building materials to be flood resistant, installation methods for flooring and walls to conform to FEMA FIA-TB#2	<b>Chapter 6</b> exposed structural and non-structural materials, including connections, to be resistant to damage, deterioration, corrosion or decay due to direct and prolonged contact with floodwater	National Evaluation Service, Inc., <i>Evaluation Plan for Determination of Flood-Resistance of Building Elements</i> Technical Bulletin FEMA FIA-TB#2: <i>Flood-Resistant Material Requirements for Buildings Located In Special Flood Hazard Areas</i> Technical Bulletin FEMA FIA-TB#8: <i>Corrosion Protection for Metal Connectors in Coastal Areas for Structures Located in Special Flood Hazard Areas</i>
<b>60.3(a)(3)(iv)</b> electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities to be designed and/or located to protect components	<b>1612.4</b> design and construction of buildings and structures (including utility support systems) to be in accordance with ASCE 24	<b>R327.1.5</b> new and replacement mechanical and electrical systems to be elevated <b>IFGC R301.5</b> appliance installations to be elevated or otherwise protected <b>R1601.3.8</b> ducts and duct systems to be elevated	<b>Chapter 8</b> utilities and attendant equipment to be elevated or designed, constructed and installed to prevent floodwaters from entering or accumulating within the components; utilities not to be mounted on breakaway walls	FEMA 348, <i>Protecting Building Utilities From Flood Damage: Principles and Practices for the Design and Construction of Flood Resistant Building Utility Systems</i> Technical Bulletin FEMA FIA-TB#4: <i>Elevator Installation for Buildings Located in Special Flood Hazard Areas</i>
<b>60.3(a)(6)(i)</b> new/replacement sanitary sewage system designed to minimize/eliminate infiltration/discharges <b>(ii)</b> onsite waste disposal systems located to avoid impairment or contamination	<b>Appendix G 401.3</b> Sewer facilities	<b>R327.1.6</b> general performance, refer to Chapter 3 of the <i>International Private Sewage Disposal Code</i> ®	<b>Section 8.3</b> buried and exposed plumbing systems, systems below flood level, and sanitary systems, including septic tanks	FEMA 348, <i>Protecting Building Utilities From Flood Damage: Principles and Practices for the Design and Construction of Flood Resistant Building Utility Systems</i>

**Table 1. Summary of selected key NFIP provisions, code citations, and reference documents.**

(See Appendices B and C for comprehensive crosswalks of the NFIP regulations to the IBC® and IRC™, respectively.)

Key Provisions of the NFIP	2000 IBC®	2000 IRC™	ASCE 24-98	Other Publications
60.3(b)(1) require permits for all development, including placement of manufactured homes	Appendix G 101.3 Scope (and definition of Development)	R101.2 Scope <b>R105.3.1.1</b> specifically addresses substantial improvement and substantial damage of existing buildings <b>Appendix E</b> Manufactured Housing Used as Dwellings AE101, Exception, refers to IRC Section R327 <b>Appendix J</b> Existing Buildings AJ102.5 work in existing buildings in flood hazard areas per R105.3.1.1	<b>Section 1.1</b> defines the scope to be new structures, including subsequent work and substantial repair or substantial improvement	ASFPM and Federal Interagency Floodplain Management Task Force, <i>Addressing Your Community's Flood Problems: A Guide for Elected Officials</i>  FEMA EMI IS-9, <i>Managing Floodplain Development Through the NFIP</i> (independent study course)
60.3(b)(5) where flood elevation data are provided:  (i) obtain lowest floor elevation of new and substantially improved structures  (ii) for floodproofed non-residential structures, obtain elevation to which structure was floodproofed  (iii) maintain records of elevations	<b>109.3.3</b> inspection and submission of Elevation Certificate  <b>1612.5.1</b> submission of specific certifications, including Elevation Certificate  <b>104.7 and Appendix G 103.8</b> retention of Department records	<b>R109.1.3</b> inspections and submission of Elevation Certificate  <b>R104.7</b> retention of Department records	Does not address administrative requirements or submission of certifications	<i>Elevation Certificate</i> (FEMA Form 81-31). [Online]. Available: <a href="http://www.fema.gov/library/elvcert.pdf">http://www.fema.gov/library/elvcert.pdf</a>  <i>Floodproofing Certificate</i> (FEMA Form 81-65) [Online]. Available: <a href="http://www.fema.gov/nfip/ff81-65.pdf">http://www.fema.gov/nfip/ff81-65.pdf</a>
60.3(b)(8) require installation of MFH using methods to minimize flood damage, including anchoring, and to resist wind forces	<b>Appendix G 501.1</b> elevation requirements  <b>Appendix G 501.2</b> foundation requirements  <b>Appendix G 501.3</b> anchoring requirements	<b>R327.1.8</b> MFH elevation per R327.2; anchor and tie-down per AE604 and AE605. MFH in Floodways per IBC  <b>Appendix AE101</b> refers to IRC Section R327	Does not specifically address manufactured housing separate from other buildings. Foundations for MFH to be designed as other foundations and based on location within flood hazard areas (with and without high velocity wave action)	FEMA 85, <i>Manufactured Home Installation in Flood Hazard Areas</i>
60.3(c)(2) require all new and substantially improved structures to have the lowest floor elevated to or above the flood elevation	<b>1603.1.6</b> Flood load (information in application)  <b>1612.4</b> design and construction (reference ASCE 24)  <b>3402.1</b> Exception requires substantial improvement or repair of existing buildings to be brought into compliance with flood provisions	<b>R105.3.1.1</b> specifically addresses substantial improvement and substantial damage of existing buildings  <b>R327.2.1</b> elevation requirements, except for conforming enclosures  <b>R327.1.4</b> lowest floor, excluding enclosures that meet certain use limitations and are compliant	<b>Section 2.4</b> specifies general elevation requirements  <b>Section 2.5 and Chapter 5</b> detail foundation design requirements	FEMA 259, <i>Engineering Principles and Practices for Retrofitting Flood Prone Residential Buildings</i>

**Table 1. Summary of selected key NFIP provisions, code citations, and reference documents.**

(See Appendices B and C for comprehensive crosswalks of the NFIP regulations to the IBC® and IRC™, respectively.)

Key Provisions of the NFIP	2000 IBC®	2000 IRC™	ASCE 24-98	Other Publications
<b>60.3(c)(3)</b> for non-residential structures: <b>(i)</b> lowest floor elevated, or <b>(ii)</b> floodproofed (including utility and sanitary facilities)	<b>1612.4</b> design and construction (reference ASCE 24)	Not applicable to One-and Two-Family Dwellings	<b>Section 2.4</b> specifies general elevation requirements <b>Chapter 7</b> details restrictions and requirements for dry and wet floodproofing	Technical Bulletin FEMA FIA-TB#3: <i>Non-Residential Floodproofing – Requirements and Certification for Buildings Located in Special Flood Hazard Areas</i> FEMA 348, <i>Protecting Building Utilities From Flood Damage: Principles and Practices for the Design and Construction of Flood Resistant Building Utility Systems</i>
<b>60.3(c)(4)</b> for floodproofed non-residential structures: <b>(i)</b> registered design professional to develop and/or review the structural design and certify <b>(ii)</b> certification retained in records	<b>104.7</b> retention of Department records <b>1612.5.1</b> submission of specific certifications, including Elevation Certificate	Not applicable to One-and Two-Family Dwellings	<b>Chapter 7</b> details restrictions and requirements for dry and wet floodproofing, but does not include administrative requirements	<i>Floodproofing Certificate</i> (FEMA Form 81-65) [Online]. Available: <a href="http://www.fema.gov/nfip/ff81-65.pdf">http://www.fema.gov/nfip/ff81-65.pdf</a>
<b>60.3(c)(5)</b> fully enclosed areas below elevated buildings are to be: limited in use (parking, access, storage); provided with flood openings that meet minimum criteria or are designed and certified by a registered design professional	<b>1202.3</b> under-floor ventilation (exception allows flood openings) <b>1612.4</b> design and construction (reference ASCE 24) <b>1612.5.1</b> Flood hazard certificates (for flood opening designs other than as specified)	<b>R327.2.2</b> enclosed area below design flood elevation, use limitations and flood opening specifications <b>R408.5</b> Enclosing underfloor spaces to have flood openings Garages allowed if elevated or compliant with provisions for enclosures below elevated buildings	<b>Section 2.6</b> details provisions for enclosures below DFE, including engineered and non-engineered openings	Technical Bulletin FEMA FIA-TB#1: <i>Openings in Foundation Walls for Buildings Located in Special Flood Hazard Areas</i>
<b>60.3(d)(3)</b> prohibit floodway encroachment unless no impact on flood levels is demonstrated	<b>Appendix G 103.5</b> and <b>G 401.1</b> floodway development not authorized unless no increase in flood level is demonstrated	<b>R301.2.4</b> residential development in floodways to be reviewed under the IBC® <b>R327.1.8</b> manufactured housing in floodways to comply with the IBC®	<b>Section 2.3</b> flood elevations and conveyance to be maintained	FEMA EMI IS-9, <i>Managing Floodplain Development Through the NFIP</i> (independent study course) FEMA FIA-12, <i>Appeals, Revisions, and Amendments to NFIP Maps: A Guide for Community Officials</i>

**Table 1. Summary of selected key NFIP provisions, code citations, and reference documents.**

(See Appendices B and C for comprehensive crosswalks of the NFIP regulations to the IBC® and IRC™, respectively.)

Key Provisions of the NFIP	2000 IBC®	2000 IRC™	ASCE 24-98	Other Publications
<b>Additional requirements for buildings and structures in flood hazard areas subject to high velocity wave action (V Zones)</b>				
<b>60.3(e)(4)</b> require all new and substantially improved construction to be elevated on pilings and columns so that:  <b>(i)</b> bottom of lowest horizontal structural member of the lowest floor is at or above the flood elevation,  <b>(ii)</b> pile or column foundation and structure are anchored to resist flotation, collapse and lateral movement due to wind and water loads; registered design professional to develop or review the design, specifications and plans and provide certification	<b>1603.1.6</b> specifies elevation of the lowest of the bottom of the lowest horizontal structural member  <b>1605.2.2</b> and <b>1605.3.1.2</b> flood loads and combined loads  <b>1612.4</b> design and construction (reference ASCE 24)  <b>1612.5.2</b> submission of certifications	<b>R327.3.1</b> elevation requirements  <b>R327.3.2</b> foundation requirements, including wind and water loads  <b>R327.3.5</b> registered professional to certify design and methods of construction	<b>Section 2.4</b> and <b>Section 4.4</b> specify elevation requirements  <b>Section 2.5, Chapter 4, and Chapter 5</b> address foundations and designs	FEMA 55, <i>Coastal Construction Manual</i> Technical Bulletin FEMA FIA-TB #8: <i>Corrosion Protection for Metal Connectors in Coastal Areas for Structures Located in Flood Hazard Areas</i>
<b>60.3(e)(5)</b> enclosed areas, if any, are to be constructed with non-supporting, breakaway walls, lattice, or screening intended to collapse under wind and water loads; uses limited to parking, building access, or storage	<b>1612.4</b> requires design and construct in accordance with ASCE 24  <b>1612.5.2</b> submission of certification of breakaway wall design under certain circumstances	<b>R327.3.3</b> specifications for walls and partitions of enclosures below elevated buildings, specifically for breakaway walls	<b>Section 4.6</b> outlines provisions for enclosures below DFE with breakaway walls, and references ASCE 7 (Section 5.3.2.2) for design criteria	FEMA 55, <i>Coastal Construction Manual</i> Technical Bulletin FEMA FIA-TB #5: <i>Free of Obstruction Requirements for Buildings Located in Coastal High Hazard Areas</i>  Technical Bulletin FEMA FIA-TB #9: <i>Design and Construction Guidance for Breakaway Walls Below Elevated Coastal Buildings</i>

## **2. Approaches to Floodplain Management**

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States and communities throughout the U.S. take a number of approaches to floodplain management. While this guide does not cover every variation, it highlights three common approaches to illustrate the types of issues you may face in your community: the comprehensive approach, the stand-alone floodplain management regulation approach, and the building code approach. Worksheets A and B (pages 2-8 and 2-9) can be used to help you assess your current floodplain management practices and procedures. Worksheet C (page 2-10) outlines steps to facilitate consideration of changes to incorporate the I-Codes™.

### **2.1 The Comprehensive Approach**

Under the broad concept of “floodplain management,” many communities coordinate several separate regulatory functions in separate agencies to achieve multiple land use, environmental, and public safety goals. These goals often include avoiding flood hazard areas when buildable land is available outside of mapped flood hazard areas, and otherwise minimizing flood hazard area development. Minimization techniques include such measures as low density zoning, waterway buffers or setbacks, transfer of development rights, evacuation access requirements, and others. While specific programs or functional organizations may vary considerably from community to community, the “comprehensive approach” to floodplain management is generally considered to include:

- A *plan*, whether it is called a comprehensive plan, general plan, land use plan, master plan, or is a combination of several plans. This plan is a collection of policies and guidance on how the community is expected to grow, change, and look in the future. With respect to flood hazard areas, this plan may recognize existing and future risks and establish a goal of reducing future exposure through various mechanisms.
- A *zoning ordinance*, which is a tool to help achieve the goals set forth in the plan. Zoning typically divides a community into districts and establishes use and development criteria within each district type. Typical zoning districts are residential, commercial, industrial, and agriculture, and various combinations of these uses. Development criteria typically specify such parameters as density, size, bulk, height, setbacks, and appearance. Some communities address floodplains as a separate conservation zone with its own specifications, or

as an “overlay” to the other zones, in which case the zoning specifications are modified to achieve flood-related goals.

- A *subdivision ordinance*, which is another tool to achieve the planning goals. These regulations typically address lot size, shape, and setbacks; curbs, sidewalks, and gutters; open space; and public improvements such as street layout and dimensions, drainage and stormwater management, and installation of utilities. Many subdivision ordinances are designed to avoid mapped flood hazard areas through the use of open space conservation and setbacks from bodies of water. Where floodplain impacts are unavoidable, ordinances may guide development to less hazard-prone areas through lot layouts to put building pads on higher ground, or by requiring consideration of non-fill methods of elevating buildings.
- *Building and other health and safety codes*, which are applied after decisions regarding what and where to build have been made. The primary purpose of building and other health and safety codes is to provide minimum requirements to safeguard the public safety, health, and general welfare.

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The comprehensive approach yields another potential benefit. Avoiding and minimizing flood hazards may result in credits under the NFIP’s Community Rating System, described in Section 3.3.

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For a complete discussion of the comprehensive approach to floodplain management, and for an examination of a variety of tools to achieve flood damage reduction goals through the subdivision process, refer to *Subdivision Design in Flood Hazard Areas*, Planning Advisory Service Report Number 473, American Planning Association, September 1997.

## 2.2 Stand-Alone Floodplain Management Regulations Approach

Many communities that participate in the NFIP have adopted a single ordinance to address most, if not all, of the minimum requirements of the NFIP. Typically administered by a planning office, this single-purpose, stand-alone ordinance also incorporates other state and community floodplain management requirements, including administrative procedures, land management criteria, and building-specific provisions. The extent to which the stand-alone ordinance is coordinated with the building code and other health and safety codes, whether on paper or through coordinated review procedures, varies significantly from state to state and community to community.

Some states and communities do not regulate development in general, but have a single “special use” permit that is required only in mapped flood hazard areas. Typically, this approach is taken solely to meet the minimum floodplain management requirements of the NFIP.

### **2.3 International Code Series Approach**

Prior to the availability of the 2000 I-Codes™, the model building codes included flood-related provisions to varying degrees, but none were fully consistent with the requirements of the NFIP (FEMA, *Code Compatibility Report*). Therefore, to participate in the NFIP most communities adopted companion floodplain management regulations or ordinances that typically included administrative, land use, and building sciences provisions.

With the 2000 I-Codes™, it is possible to integrate building codes and floodplain management into a single administrative process. In order to participate in the NFIP using this approach, all of the I-Codes™, including IBC® Appendix G, must be adopted. Otherwise, not all “development,” as defined by the NFIP, is regulated adequately.

The inclusion of flood resistant provisions in the I-Codes™ may bring new functions to many building departments, specifically as outlined in IBC® Appendix G. For others it may help streamline the development process.

### **2.4 Assessing Your Community’s Current Approach**

Regulating flood hazard area development cannot be approached, on a national basis, as a “one size fits all” process. Communities vary considerably both within a state and across the country. Each state has its own statutes and regulations, which may require – or limit – how a community approaches building codes, other health and safety codes, and floodplain management regulations.

The *International Building Code*®, including Appendix G which specifically addresses the administrative requirements, manufactured housing provisions, and certain non-building provisions of the NFIP, includes the provisions necessary to meet NFIP floodplain management requirements. Therefore, as your state and/or community moves toward adopting the I-Codes™, including the *International Residential Code*™

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When the IBC® is adopted, the IRC™ is adopted by reference. If you specifically exclude the IRC™ in your Ordinance for Adoption, then you must recapture one- and two-family dwellings in another ordinance in order to participate in the NFIP. Similarly, if you do not adopt IBC® Appendix G then you must recapture its provisions in another ordinance.

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and the other utility-related I-Codes™, you will have to determine the best way to insert it into, and coordinate it with, your current land planning and regulatory framework.

One issue you need to consider is whether the I-Codes™ will replace some or all of your current floodplain management regulations. During this consideration, you can use the crosswalks in Appendices B and C to compare specific sections of the IBC® and the IRC™ with the NFIP regulations.

The worksheets at the end of this chapter are useful tools to assess your community's current approach. The left side of Worksheet A (page 2-8) lists certain functions and regulatory requirements related to the flood resistant provisions of the NFIP. Across the top are listed the I-Codes™ in which the functions and requirements can be found.

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In the next chapter, Section 3.1 describes *development* other than buildings that is subject to regulation under the NFIP. Section 3.2 describes the flood resistant provisions of the I-Codes™ that deal with on-site utility systems.

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Worksheet B (page 2-9) is set up for use in the following manner:

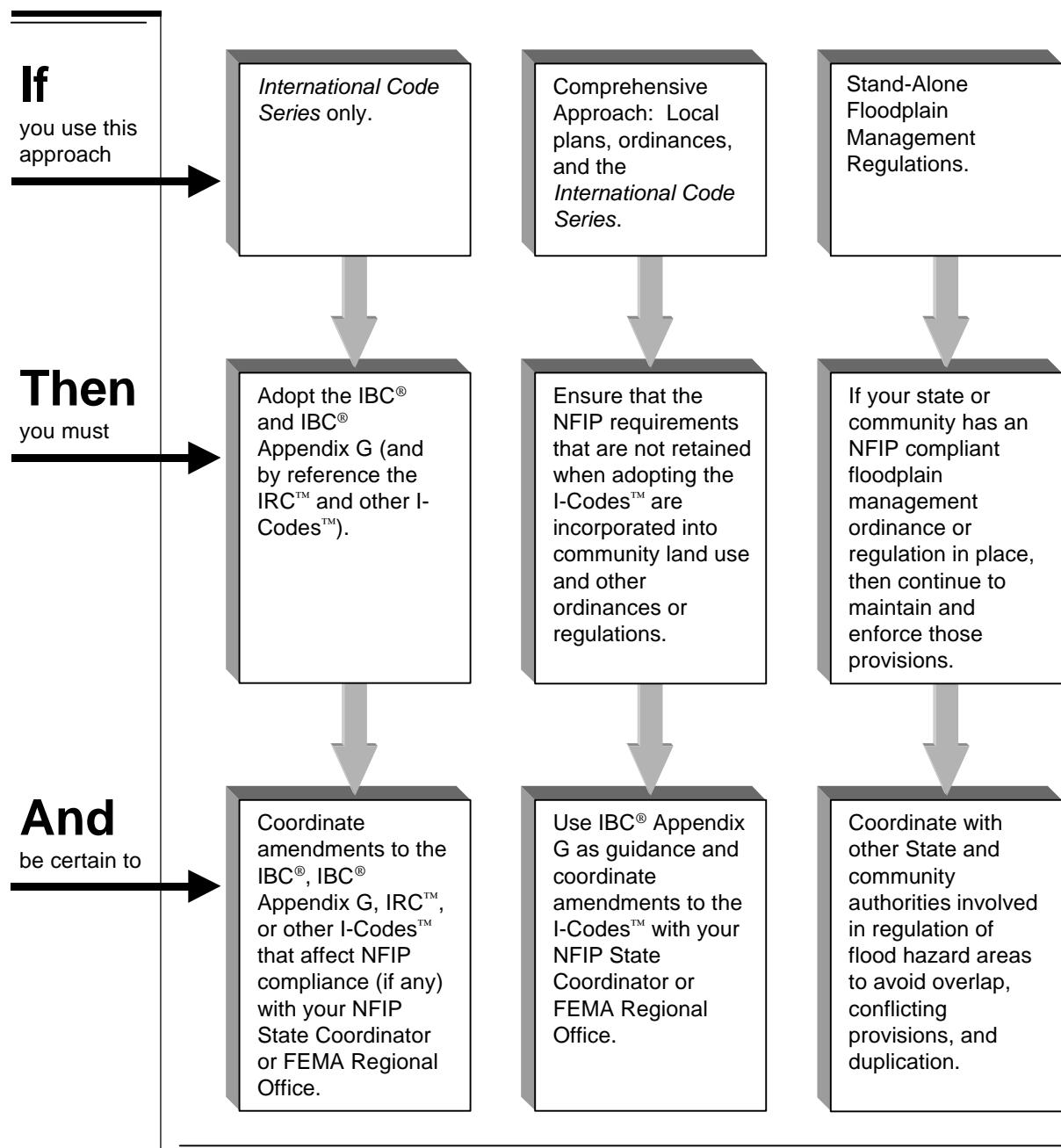
- Across the top you can list all of your community's departments that are involved in regulating flood hazard areas. The typical departments are listed, and space is provided for you to add others, if appropriate to your community's organization.
- Consider the functions and regulatory requirements of the NFIP that are listed on the right. Mark the table to indicate the department that currently is responsible for each, keeping in mind that more than one department may share some responsibilities. Representatives from each of these departments should be invited to participate in the decision process that comes next.

## 2.5 Modifying Your Community's Approach

The next step towards using the I-Codes™ to participate in the NFIP is to get together with representatives of each department that currently has a role in floodplain management, as noted on Worksheet B. The purposes are to determine your approach (Figure 1) and to start the process of effectively integrating the I-Codes™. Keep the following objectives in mind:

- All NFIP requirements must be addressed;
- If flood-related provisions are addressed in multiple codes or regulations, then coordination is critical to avoid overlap, conflicting provisions, and duplication;

**Figure 1. Approaches to fulfilling the requirements of the NFIP.**



**NOTE:** Take extra care if you propose amendments to the flood hazard provisions of the IBC®, IBC® Appendix G, the IRC™, or other I-Codes™. Amendments should be carefully reviewed to avoid inconsistencies with the NFIP minimum requirements. Consult with your NFIP State Coordinator or your FEMA Regional Office.

- A department must be designated to be responsible for each code or regulation related to floodplain management; and
- Communication between the departments that deal with related provisions needs to be arranged to facilitate the development review process.

More than likely a series of meetings will be needed to cover the recommended topics of discussion and decision steps outlined on Worksheet C (page 2-10).

## **2.6 Advantages of Reducing Flood Losses Through the *International Code Series***

Continued close coordination between departments is vital to achieving a comprehensive approach to floodplain management. Adopting the I-Codes™ may result in shifting of some responsibilities to the building department. As part of the discussion and decision process outlined in Section 2.5, some of the implications of participating in the NFIP through the I-Codes™ should be addressed, including:

- *All Hazard-Related Building Construction Requirements are in One Place.* In the past, the model building codes have included, to some extent, provisions related to natural hazards such as seismic hazards, high winds, severe winter storms, and flood hazards. The I-Codes™ address all of these hazards on a consistent, rational basis that allows mitigation of the effects of those natural hazards that are found within each jurisdiction's boundaries.
- *Minimize Code Conflicts.* The likelihood of conflicting code provisions or interpretation increases when a community has two or more regulations that apply to a single project. When different departments, agencies, or offices administer the building and other health and safety codes, along with the floodplain management ordinance, conflicts or misinterpretation among various code and ordinance provisions can result. This is especially true when one office administers the floodplain management provisions and another office administers the building code. Another way that code conflicts arise is when amendments are made to one code or ordinance and others are not amended at the same time to maintain consistency.
- *Strengthened Enforcement.* Building departments routinely inspect construction, and they have clear authority and responsibility to require compliance and to enforce building permit conditions. Stand-alone floodplain management ordinances also include administrative provisions, including enforcement. Often, these enforcement provisions do not parallel the building department's enforcement

procedures, especially if a model floodplain management ordinance was adopted without tailoring to local circumstances. Having separate and perhaps differing provisions for inspection and enforcement may lead to problems, such as if a permittee claims inconsistent treatment by different departments, agencies, or offices.

- *Effective, Routine Inspections.* Building departments typically conduct multiple inspections at specific times during the construction process, and builders are accustomed to standard notification procedures. In communities where the flood resistant design and construction provisions are enforced by a department other than the building department, inspections to check those specific provisions may not be conducted with the same regularity or may not be coordinated with the building inspections.
- *Consistent Permit Conditions and Requirements.* Other problems arise if the building permit, construction plans and specifications, and inspection forms do not explicitly state the elements required for compliance with flood resistant design and construction requirements. Inspectors may lack the proper information to perform their required duties effectively. For example, it would be difficult to verify that a building footprint is located outside of the floodway if the floodway boundary is not shown on the site plan submitted as part of the application for a permit. Similarly, if the flood openings specifications for an enclosed area beneath an elevated building are described in writing as a condition of the building permit but are not shown on the construction drawings, they may be overlooked by both the contractor and the building inspector.
- *Improved Treatment of Existing Buildings.* One of the NFIP requirements that community officials sometimes find challenging to enforce effectively applies to existing buildings that are located in flood hazard areas if they are proposed for improvements or restoration and repair after substantial damage. Building departments routinely handle permits for existing buildings, yet planning and zoning departments, which are often responsible for administering floodplain management ordinances, rarely deal with proposals to modify sites that are already developed. This has been known to lead to gaps in enforcement of the substantial improvement and substantial damage requirements of the NFIP.

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Section 3.5 provides additional background on substantial improvement and repair of substantially damaged buildings in flood hazard areas.

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## Worksheet A. The NFIP and the I-Codes™.

National Flood Insurance Program Provisions and Processes	The International Code Series						
	IBC	IBC App. G	IRC	IPC	IMC	IPSDC	IFGC
<b>Planning and Zoning</b>							
1. Compatibility with conservation, resource, or overlay zoning (density, setbacks, etc.).							
2. Consideration of overall planning objectives, including flood hazard reduction objectives.		✓					
3. Stormwater management and drainage.		✓					
4. Subdivision of land.		✓					
<b>Development Review</b>							
1. Changes to land (filling, grading, paving, excavation, mining, dredging, drilling, channel modifications, alteration of sand dunes and/or mangrove stands).		✓					
2. One- and two-family dwellings (except in Floodways).			✓				
3. Buildings and structures (including tanks, towers, and one- and two-family dwellings in Floodways).	✓						
4. Site-related public/private utilities (sewage disposal, water supply).		✓	✓	✓		✓	
5. Building support utilities (electrical, plumbing, HVAC, fuel).	✓		✓	✓	✓		✓
6. Existing buildings and structures (additions, alterations, repairs, rehabilitations).	✓		✓				
7. Site development (water, sewer, drainage, on-site waste disposal systems).		✓					
8. Transportation infrastructure (roads, bridges, culverts).							
9. Other water resources infrastructure (dams, ponds, levees, floodwalls).							
10. Placement/replacement of manufactured housing.	✓	✓					
11. Recreational vehicle parks.	✓						
12. Refer to other federal, state, local agencies and require appropriate permits.	✓						
13. Review and grant of variances.	✓	✓					
<b>Records</b>							
1. Maintain records of corporate boundaries; report changes to FEMA.							
2. Maintain record of permits and variances, including Elevation Certificates and Floodproofing Certificates; make available for public inspection.	✓	✓	✓				
3. Maintain flood hazard maps; make available for public inspection.							
4. Identify, record, and report map needs to FEMA.							
<b>Inspection and Enforcement</b>							
1. Subdivision lot layout (with respect to flood hazard areas).		✓					
2. Location of building/structure footprints on lot.	✓	✓					
3. Foundations.	✓		✓				
4. Lowest floor elevation (buildings and structures).	✓		✓				
5. Lowest floor elevation (manufactured housing units).		✓	✓				
6. Enclosure below lowest floor (flood openings or breakaway).	✓		✓				
7. Collect/review certificates (elevation, floodproofing, flood openings, breakaway wall).	✓		✓				
8. Damaged buildings (to determine if building is substantially damaged).	✓		✓				

## Worksheet B. Assessing your community's approach.

Your Community's Organization										Provisions and Processes (Check which Department handles each code provision or function)	
Planning	Zoning	Sub-division	Health	Flood Control or Storm-water	Engineering or Public Works	Building Safety	Other	Other	Other	Planning and Zoning	
										1. Compatibility with conservation, resource, or overlay zoning (density, setbacks, etc.).	
										2. Consideration of overall planning objectives, including flood hazard reduction objectives.	
										3. Stormwater management and drainage.	
										4. Subdivision of land.	
Development Review											
										1. Changes to land (filling, grading, paving, excavation, mining, dredging, drilling, channel modifications, alteration of sand dunes and/or mangrove stands).	
										2. One- and two-family dwellings (except in Floodways).	
										3. Buildings and structures (including tanks, towers, and one- and two-family dwellings in Floodways).	
										4. Site-related public/private utilities (sewage disposal, water supply).	
										5. Building support utilities (electrical, plumbing, HVAC, fuel).	
										6. Existing buildings and structures (additions, alterations, repairs, rehabilitations).	
										7. Site development (water, sewer, drainage, on-site waste disposal systems).	
										8. Transportation infrastructure (roads, bridges, culverts).	
										9. Other water resources infrastructure (dams, ponds, levees, floodwalls).	
										10. Placement/replacement of manufactured housing.	
										11. Recreational vehicle parks.	
										12. Refer to other federal, state, local agencies and require appropriate permits.	
										13. Review and grant of variances.	
Records											
										1. Maintain records of corporate boundaries; report changes to FEMA.	
										2. Maintain record of permits and variances, including Elevation Certificates and Floodproofing Certificates; make available for public inspection.	
										3. Maintain flood hazard maps; make available for public inspection.	
										4. Identify, record, and report map needs to FEMA.	
Inspection and Enforcement											
										1. Subdivision lot layout (with respect to flood hazard areas).	
										2. Location of building/structure footprints on lot.	
										3. Foundations.	
										4. Lowest floor elevation (buildings and structures).	
										5. Lowest floor elevation (manufactured housing units).	
										6. Enclosure below lowest floor (flood openings or breakaway).	
										7. Collect/review certificates (elevation, floodproofing, flood openings, breakaway wall).	
										8. Damaged buildings (to determine if building is substantially damaged).	

## Worksheet C. Discussion topics, decision steps.

Steps	Actions	Date Completed
1	Identify departments involved in floodplain management (Worksheet B) and convene a meeting.	
2	Review how each of the NFIP functions and regulatory requirements are met under your current approach to floodplain management.	
3	Review Chapter 3 to understand additional floodplain management implications of using the I-Codes™ to participate in the NFIP. This chapter also briefly discusses some opportunities to further reduce the impacts of flooding beyond those required under the NFIP.	
4	Review Worksheet A to understand which of the NFIP functions and requirements are addressed in each of the I-Codes™.	
5	Discuss the NFIP functions and requirements that are currently performed by departments other than those that are responsible for administering the various building codes.	
6	Determine which of the I-Codes™ your community is required to adopt by state law, or which you will choose to adopt if your state does not have a requirement. Refer to Figure 1 to see how this decision may also determine whether you have to develop another ordinance to recapture certain of the floodplain management provisions required by the NFIP.	
7	Review Worksheet B again with respect to how the NFIP functions and requirements are currently addressed. Decide whether those functions and requirements will continue to be administered by the noted departments, which may be appropriate to the comprehensive approach and to effectively guide development as part of the planning, zoning, and subdivision processes.	
8	Identify which functions and requirements will be administered by the building department upon adoption of the I-Codes™.	
9	If the decision is to consolidate some or all of those functions and requirements in the building department, then a critical review of all of the existing ordinances that address floodplain management provisions must be prepared to determine if there are any elements that are <u>not</u> covered by the I-Codes™. Those elements must be recaptured either by amending the I-Codes™ or by inclusion in other ordinances.	
10	If elements are to be recaptured, review the I-Codes™ and prepare the appropriate language to be included in the Ordinance for Adoption.	
11	Review Section 3.3 and Section 3.4 to understand how certain higher standards may be beneficial to your community.	
12	If your community decides to adopt higher standards, prepare the appropriate language to be included in the Ordinance for Adoption.	
13	If necessary, prepare a separate floodplain management ordinance to retain only those provisions not covered by the I-Codes™.	
14	Submit the Ordinance(s) for Adoption of the I-Codes™, plus the separate floodplain management ordinance, to your NFIP State Coordinator. The NFIP State Coordinator will coordinate with the FEMA Regional Office to review the materials and determine whether they are acceptable for your community's continued participation in the NFIP.	

### **3. Implications of Adopting the I-Codes™**

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As your community considers whether to use the I-Codes™ as the primary means to regulate floodplain development and to participate in the National Flood Insurance Program, you can use this chapter as a resource. It covers some of the floodplain management implications that will need to be addressed as you make your decisions. Worksheet B at the end of Chapter 2 will help you assess your current floodplain management practices and procedures, the starting point for determining how the adoption of the I-Codes™ will impact those practices and what changes will be necessary as a result.

Topics covered in this chapter include floodplain development other than buildings: the utility-related I-Codes™; the NFIP's Community Rating System (CRS); choosing higher standards for flood hazard area development; regulating substantial damage and substantial improvement; and the NFIP's Increased Cost of Compliance insurance coverage. Chapter 4 addresses community responsibilities, including record keeping, permitting requirements, modifications to the I-Codes™, flood hazard map duties, Elevation Certificates, inspections, and variances.

#### **3.1 Development Other Than Buildings**

The NFIP requires that minimum development standards be applied to all development, including buildings and structures that are built or substantially improved in the flood hazard area. The NFIP definition of development is very broad and includes development activities other than buildings. The same definition is included in IBC® Appendix G. These other development activities are regulated to prevent encroachments and obstructions that may increase flood heights.

Because the NFIP requires communities to regulate all development in flood hazard areas, a code that applies only to buildings does not fulfill the requirements for participation. The building code, or a combination of the code and another ordinance, must address all development. It is also important to note that adopting the IBC® without Appendix G will

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The NFIP and IBC® Appendix G define "development" to mean any man-made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations, or storage of equipment or materials. [NFIP §59.1]

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not meet NFIP requirements because the IBC® alone does not contain the floodplain management criteria that apply to development other than buildings.

IBC® Appendix G addresses these development activities: subdivision of land, site development and utilities, as well as placement of manufactured home units and recreational vehicles.

Certain other development activities that may not normally be addressed by building officials are included in the scope of IBC® Appendix G. Specifically, development includes “other structures” that may impact waterways and floodways, such as fills, transportation infrastructure (roads, bridges, and culverts), and water resources facilities (flood walls and levees, channel modifications, dams, and ponds). For the most part, these activities may be permitted if outside of a mapped floodway, although analyses are to be prepared if a floodway has not been determined.

### **3.2 On-Site Utility Systems Implications Pertaining to the Utility-Related I-Codes™**

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Section 1.13 explains the Base Flood Elevation (BFE) used by the NFIP and the Design Flood Elevation (DFE) used by the I-Codes™ and ASCE 24.

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With respect to minimizing flood damage, the overall objectives for on-site utility systems in buildings constructed in flood hazard areas are to minimize damage and to facilitate clean up and repairs so that people can return to their homes and businesses in a timely manner after a flood. The most effective way to achieve this objective is to elevate utilities to or above the Design Flood Elevation (DFE). This requirement is specifically addressed in the IBC®, the IRC™, and the specific utility codes, including the *International Mechanical Code®*, the *International Plumbing Code®*, the *International Private Sewage Disposal Code®*, and the *International Fuel Gas Code®*.

Post-flood field investigations conducted by FEMA reinforce the critical importance of elevating or otherwise protecting building support utility systems from floodwater that may enter or accumulate within the system components. Exterior mechanical units, such as heat pumps and air conditioning units, are easily elevated to or above the DFE on platforms or fill pads. In these cases, care should be directed to more than just the height of the platform. Utility platforms are subject to the same flood loads as building foundations, and should be designed and constructed to

resist those loads. Platforms may be independent from the base building structure or attached by cantilevering from the structure. If higher than three to four feet off the ground, access stairs may be required by the applicable code, and the platform should be sized to allow access for repair and maintenance of the supported equipment.

Where elevating building support utility equipment or systems above the DFE is not feasible, the NFIP regulations provide a performance-based option:

*If a proposed building site is in a flood-prone area, all new construction and substantial improvements shall . . . (iii) be constructed by methods and practices that minimize flood damages, and (iv) be constructed with electrical, heating, ventilation, plumbing, and air conditioning equipment designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding. [§60.3(a)(3)]*

To date, FEMA and most states and communities have relied on manufacturers' specifications, warranties, and written statements that specify which types of equipment meet this performance-based provision. For the community, this suggests that applicants may be required to submit a written statement from the manufacturer before a permit with utility service equipment below the DFE is approved. States and communities have reported that manufacturers almost always refuse to provide such a statement or warranty because most equipment is not designed to be flood resistant. Indeed, experience indicates that most mechanical and electrical equipment suffers major damage when exposed to floodwater.

As of early 2000, each of the I-Codes™ addresses protection of building support utility systems from flood damage in the following manner:

- *2000 International Building Code®*. Section 1612.1 sets forth the general requirement that “all new construction of buildings, structures and portions of buildings and structures, including substantial improvements and restoration of substantial damage to buildings and structures, shall be designed and constructed to resist the effects of flood hazards and flood loads.” Although this text does not specifically reference utility service equipment, the NFIP requires that it apply to all elements of a building, including building support utility systems. Subsequent chapters refer to the individual I-Codes™ for specific utilities.

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FEMA has prepared a guidance document on utilities: *Protecting Building Utilities From Flood Damage: Principles and Practices for the Design and Construction of Flood Resistant Building Utility Systems* (FEMA 348).

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- *2000 International Residential Code<sup>TM</sup>*. Section R327 covers general flood resistant construction provisions, including establishment of the design flood elevation (DFE) and protection of mechanical systems, electrical systems, and ducts by elevation to or above the DFE. Section R327.1.6 includes requirements for the protection of water supply and sanitary sewage systems located in flood hazard areas, requiring both to be designed to minimize infiltration into the systems. In addition, sewage systems are to be designed to minimize discharges of sewage into floodwater.
- *2000 International Plumbing Code<sup>®</sup>*. Section 309 specifically addresses flood resistant requirements. Systems and equipment in structures in flood hazard areas are to be capable of resisting hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy. Certain system elements must be sealed or elevated, including water supply pumps, potable water well seals, and manhole covers.
- *2000 International Mechanical Code<sup>®</sup>*. Section 301.13 includes the general requirement that mechanical systems are to be placed above the BFE or protected to prevent water from entering or accumulating within appliance ducts or plenum spaces. Sections 602.4 and 603.7.3 require that plenum spaces and ducts meet the same criteria or they are to be capable of resisting hydrostatic and hydrodynamic loads and stresses, including buoyancy.
- *2000 International Private Sewage Disposal Code<sup>®</sup>*. Certain types of private sewage disposal systems involve placement of fill dirt. Sections 301, 303, and 304 are comprehensive in that prior to approval of a disposal system, the building official is required to receive written evidence that construction in and filling of flood hazard areas is acceptable. The code includes a number of restrictions on placement of private sewage disposal systems in floodways, and mound systems are not allowed in the flood hazard area (Section 902). Section 805 specifies that new and replacement holding tanks are to be protected from flood damage, adequately anchored to counter buoyant forces, and vents and service manholes are to be at least two feet above the regulatory flood elevation established by the local jurisdiction.
- *2000 International Fuel Gas Code<sup>®</sup>*. Section 301.11 includes the general requirement that appliance installations are to be placed above the BFE or protected to prevent water from entering or accumulating within appliances, ducts, or plenum spaces.

### **3.3 The NFIP's Community Rating System and the I-Codes™**

For more than 25 years, communities that participate in the NFIP have recognized flood hazards in new construction and development decisions. Many communities have chosen to guide development towards areas of lower risk and new buildings often are located out of harm's way. Until 1990, the NFIP had few incentives for communities to do more than administer the minimum NFIP regulatory provisions, and flood insurance rates were the same in every community, even though some elected to exceed those provisions.

The Community Rating System (CRS) was established to encourage specific community and state activities that go beyond the NFIP minimum floodplain management requirements and that have been shown effective at reducing damage and claims against the NFIP. In communities that apply to the CRS and are verified as implementing some of those activities, citizens who purchase flood insurance benefit from discounted premiums.

The amount of flood insurance premium discount is based on a community's CRS classification. There are ten classes, with a five-percent discount for each class. Class 10 has no premium discount, and Class 1 yields the maximum discount of 45 percent for policies on buildings in the mapped flood hazard area. A community's CRS classification is based on the number of credit points calculated for specific floodplain management activities undertaken to meet the goals of the NFIP and CRS.

Participation in the CRS is voluntary. Any community that is in full compliance with the rules and regulations of the NFIP, also called "good standing," may apply for a CRS classification. Technical support may be requested from the NFIP State Coordinator and the appropriate FEMA Regional Office. The application process is described in the *CRS Application* (FEMA FIA-15A).

Eighteen creditable activities are organized under four categories. FEMA conducted extensive evaluations of all the activities and developed a system of credit points. The points are based on how well each activity helps achieve the goals of the CRS. Communities are welcome to

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The CRS has three goals:

1. Reduce flood losses by promoting disaster resistant communities;
  2. Facilitate accurate rating of flood insurance policies; and
  3. Promote awareness of flood hazards and flood insurance.
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Adopting the I-Codes™ may improve your Building Code Effectiveness Grading Schedule (BCEGS) and could result in additional CRS credit. BCEGS, developed with input from the insurance industry and code organizations, is a standardized assessment of the building codes in effect in a community and the enforcement of those codes.

Particular emphasis is placed on building code requirements designed to mitigate losses from natural hazards.

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propose alternative approaches that go beyond the minimum requirements of the NFIP. FEMA will evaluate alternative approaches to determine how much, if any, CRS credit is appropriate.

The IBC® incorporates specific requirements of the NFIP, in large measure by reference to ASCE 24, *Flood Resistant Design and Construction*. ASCE 24 is organized to apply standards based on the structure categories used by the I-Codes™. This means that some standards which exceed the minimum NFIP requirements are not applied uniformly to all buildings and structures in flood hazard areas. Table 2 provides a representative selection of ASCE 24 provisions and notes on corresponding CRS credits.

**Table 2. Selected ASCE 24 provisions and opportunities for CRS credits.**

ASCE Provisions	CRS Notes
Foundations to be designed for load combinations, including flood loads	Credit for Foundation Protection
Specific standards for High Risk Flood Hazard Areas (alluvial fans, flash flood, mudslide, erosion-prone, high velocity, ice jam, and debris flow areas)	Credit based on the portion of the flood hazard area that is identified as subject to unique flood-related hazards along with Special Hazards Regulations are applied
Based on structure category and type of flood hazard area, applies freeboard to lowest floor elevation	Credit for Freeboard, depending one the additional height (from 1 to 3 feet) and weighted by potential number of structures in each category
Based on structure category and type of flood hazard area, applies freeboard to utilities and mechanical and electrical equipment	Credit for Other Higher Standards, weighted by potential number of structures in each category
Tanks to be secured against 1.5 times potential buoyancy	Credit for Other Higher Standards
Specifies foundation types allowed in flood hazard areas subject to high velocity wave action and high risk flood hazard areas	Credit for Other Higher Standards
Erosion analysis to establish minimum foundation depth in flood hazard areas subject to high velocity wave action	Credit for Other Higher Standards, prorated by percent of flood hazard area that is subject to high velocity wave action
Minimum warning time specified, and emergency operations plan required, for use of floodproofing that requires human intervention	Credit for Other Higher Standards, weighted by potential number of non-residential buildings

Some activities may be implemented by a state or a regional district rather than at the local level. For example, some states have regulations that require freeboard, or state dam safety programs may meet national standards. All communities that apply for the CRS receive credit based on approved state-wide standards and activities.

FEMA periodically reviews each CRS community's activities and performance. If the credited activities are not being implemented properly or fully, credit points and the CRS classification may be revised. A community may add, change, or drop creditable activities each year.

The discount in flood insurance premiums is only one of the rewards that a community gains by undertaking activities credited by the CRS. Other sound reasons include improved public safety, reduced damage to property and public infrastructure, avoidance of economic disruption and losses, reduction of human suffering, protection of the environment and, most importantly, promoting disaster resistant communities.

To learn more about the CRS, contact your NFIP State Coordinator, the appropriate FEMA Regional Office, or check the NFIP CRS section of FEMA's Web site at [www.fema.gov/nfip/crs.htm](http://www.fema.gov/nfip/crs.htm).

### **3.4 Choosing Higher Standards**

The NFIP sets minimum national standards that apply to all communities, regardless of the unique characteristics that may be present. For a number of reasons, states may require or communities may elect to apply provisions that exceed the minimum NFIP requirements:

- Flood history may prompt consideration of more restrictive provisions.
- Past events may have been more severe than the predicted one-percent annual exceedance probability flood (also known as the 100-year flood) or events may have occurred more often than expected.
- Communities may have identified unique hazards associated with flooding, including flash flooding, alluvial fan flooding, ice jam flooding, mud flows, debris flows, and flood-related erosion and bluff failure.
- Upland development may have altered the runoff conditions, so that the magnitude and frequency of flooding have changed since the maps were prepared.
- Advances in recent years have improved the modeling methodologies used to develop flood hazard mapping, but it may take many years before all current maps are revised to take advantage of the improved models.

Another frequently cited basis for electing to administer a higher standard is recognition that the engineering methods used to predict flood dis-

charges and water surface elevations are mathematical approximations of the natural phenomenon of flooding. In addition, flood hazard maps may be based on topographic maps with wide contour intervals, or flood discharges were not computed to anticipate upland development. Choosing higher standards, such as freeboard, adds a factor of safety to acknowledge that flood hazard area delineation is not a precise science.

The NFIP's Community Rating System, described in Section 3.3, offers credit points to communities that adopt floodplain management provisions that exceed the minimum requirements of the NFIP. The maximum number of points available for certain higher regulatory standards is summarized in Table 3. Actual points will be determined based on the specific provisions of a community's higher standards.

**Table 3. Maximum allowable points for higher standards.**

CRS Activity 430: Higher Regulatory Standards	Maximum CRS Credits (as of 1999)
Freeboard (up to 3' above BFE)	300 points
Foundation Protection (fill compaction, engineered design)	35 points
Cumulative Substantial Improvement (over specific period)	110 points
Lower Substantial Improvement Threshold (less than 50%)	90 points
Protect Critical Facilities (to 500-year flood level)	100 points
Protect Flood Storage Capacity (minimize use of fill)	80 points
Protect Natural and Beneficial Floodplain Functions	40 points
Prohibit or Limit Enclosures Below Elevated Buildings	300 points
Other Higher Standards	50 points
Low Density Zoning	600 points
Special Hazards Regulations (unique flood-related hazards)	Variable points
State-Mandated Regulatory Standards	25 points
Building Code and Staffing (BCEGS)	65 points

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Communities that adopt a freeboard usually do so to provide an inexpensive yet effective means to increase flood protection. There is another reason that property owners will appreciate. When homes are built above the BFE, whether one foot, two feet, or three feet higher, owners will qualify for a reduction in NFIP flood insurance premiums ranging from 20 to 40 percent.

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Some of the higher standards that apply specifically to buildings are described below, including sample language to revise the IBC® and the IRC™.

- **Freeboard.** Freeboard is a factor of safety that results in elevating buildings above the minimum flood elevation required by the NFIP, the Base Flood Elevation (BFE). Floods can and do rise higher than established Base Flood Elevations. For riverine waterways, continuing development in upstream watersheds will, over time, cause more runoff that may worsen flooding. Future land use conditions, such as increased development and runoff, are presently not taken into consideration in FEMA's flood insurance studies. One hundred CRS

credit points are allowed for each additional foot of freeboard up to 3 feet, for a maximum of 300 points. Some freeboard, based on structure category, is incorporated into the provisions of ASCE 24.

### Sample revision language

**IBC<sup>®</sup>:** 1612.4.1 Freeboard. A freeboard of \* ft (\* m) shall be added where the design flood elevation or other elevation requirements are specified.

**IRC<sup>TM</sup>:** R327.1.3.1 Freeboard. A freeboard of \* ft (\* m) shall be added where the design flood elevation or other elevation requirements are specified.

\* Insert selected freeboard height.

- **Prohibit Enclosures Below Elevated Buildings.** Flood hazard areas are subject to considerable forces that may be exerted on the foundation system and any portion of a building that extends below the design flood elevation. Enclosures below otherwise properly elevated buildings are allowable under the NFIP and the I-Codes<sup>TM</sup> provided they meet certain provisions. However, due to the type and extent of damage that can still be sustained, some communities choose to prohibit enclosures below elevated buildings altogether. Prohibiting enclosures below elevated buildings may earn CRS credits.

### Sample revision language

**IBC<sup>®</sup>:** 1612.4.1 Enclosures below design flood elevation. Fully enclosed areas below the design flood elevation shall not be permitted.

**Exception.** Crawl spaces that comply with the requirements for openings in enclosures below the design flood elevation in ASCE 24.

**IRC<sup>TM</sup>:** R327.2.2 Enclosed area below design flood elevation. Enclosed areas, including crawl spaces, that are below the design flood elevation shall: Fully enclosed areas below the design flood elevation shall not be permitted.

**Exception.** Crawl spaces shall: (remainder of section unchanged)

**IRC<sup>TM</sup>:** R327.3.3 Walls below design flood elevation. Delete the existing text in its entirety and replace: Walls and partitions shall not be permitted below the elevated floor.

**Exception.** Walls constructed with insect screening or open lattice.

In flood hazard areas subject to high velocity wave action, elevated buildings with enclosures less than 300 square feet in size have lower federal flood insurance rates than those with larger enclosures.

- *Limit the Size of Enclosures Below Elevated Buildings.* Limiting the size of enclosures below elevated buildings is another way to minimize flood damage. The NFIP and the I-Codes™ allow enclosures that are used solely for building access, storage, or parking. All other uses are prohibited. Enclosures for access and storage do not need to be large, otherwise owners may be tempted to convert the areas to uses that are not permissible, such as bedrooms, family rooms, bathrooms, and workshops. Limiting the size of enclosures to less than 300 square feet yields 100 CRS credit points. An additional 50 points are available if the regulations require owners to sign a non-conversion agreement whereby property owners acknowledge the use restrictions and agree not to convert enclosures below elevated buildings.

### Sample revision language

**IBC®: 1612.4.1 Enclosures below design flood elevation.**  
Fully enclosed areas below the design flood elevation shall be no larger than \* square feet (\* m<sup>2</sup>) in total enclosed area.

**Exception.** Crawl spaces that comply the requirements for openings in enclosures below the design flood elevation in ASCE 24.

**IRC™: R327.2.2 Enclosed area below design flood elevation.** Enclosed areas, ~~including crawl spaces~~, that are below the design flood elevation shall:

1. Be no larger than \* square feet (\* m<sup>2</sup>) in total enclosed area. Retain and renumber items 1 and 2.

**Exception.** Crawl spaces that comply with R327.2.2.2 and R327.2.2.3.

**IRC™: R327.3.3 Walls below design flood elevation.**

1. Are no larger than \* square feet (\* m<sup>2</sup>) in total enclosed area. Retain and renumber items 1, 2, and 3.

**Exception.**

1. Walls constructed with insect screening or open lattice.

\* Insert selected size limit.

- *Foundation and Elevation Requirements in “Coastal A Zones.”* Flood hazard areas subject to high velocity wave action are commonly called “V Zones.” Flood hazard areas immediately inland of V Zones experience some wind-driven waves and are often called “Coastal A Zones.” The line between the two zones is located where

modeling techniques predict that the wave heights will diminish to a specific height, typically three feet. Residual waves in “Coastal A Zones” impose loads on buildings, may transport sand, and can cause foundation scour. One way to address these conditions is to adopt and apply the V Zone foundation and elevation requirements in Coastal A Zones. Applying the higher foundation and elevation requirements may earn up to 135 CRS credit points.

### Sample revision language

**IBC<sup>®</sup>:** 1612.4 Exception. In flood hazard areas inland of and contiguous to flood hazard areas subject to high velocity wave action, buildings and structures shall be designed and constructed in accordance with the provisions in ASCE 24 for buildings and structures in flood hazard areas subject to high velocity wave action.

**IRC<sup>TM</sup>:** R327.2 Exception. In flood hazard areas inland of and contiguous to coastal high hazard areas that are designated in Sec. R327.3, buildings and structures shall be designed and constructed in accordance with the provisions in Sec. R327.3.

### 3.5 Substantial Improvement and Substantial Damage

The I-Codes<sup>TM</sup> definition of “substantial improvement” is consistent with the NFIP. If a proposed improvement, or the repair of damage from any cause, will cost more than 50 percent of the market value of the building before the improvement or repair, then the entire building is to be made compliant with the flood resistant provisions. This applies to all buildings and structures located in all flood hazard areas, except designated historic structures.

To help address many of the questions that often arise, FEMA prepared *Answers to Questions About Substantially Damaged Buildings* (FEMA 213). It has useful information about substantial improvements that are not triggered by a damaging event. Improvements to existing buildings generally are one of four types:

1. Rehabilitation of an older building without modifying its external dimensions.
2. Additions to an existing building that increase the square footage and usually involve modifying the structure of the original building.
3. Reconstruction of a building, in whole or in part, on the same footprint and foundation.

4. Restoration or repair of damage of any origin to restore a building to its pre-damaged condition.

Substantial damage may be caused by damage of any nature. Therefore, after a damage event, whether flood, fire, tornado, earthquake, or vandalism, the substantial damage requirements of the I-Codes™ should prompt field inspections to evaluate damage that may trigger the substantial improvement/substantial damage requirements for buildings and structures located in flood hazard areas.

After a damage event that affects multiple properties or large areas, buildings that are in flood hazard areas should be checked for damage. Some communities distribute flyers explaining permit requirements and how exposure to future flood damage can be reduced during repairs. Most property owners may be unaware that they need permits to repair and restore damaged buildings.

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■ Complete with detailed diagrams and explanations, *Homeowner's Guide to Retrofitting: Six Ways to Protect Your House from Flooding* (FEMA 312), is a good resource for owners, designers, and builders who are considering improvements and repairs.

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Quick action is needed when substantial damage is discovered because most owners want to repair or rebuild immediately and get back to “normal.” It is good to keep in mind that if they have been damaged by flood, then “normal” means they are likely to get damaged again by the next flood. After major natural hazard events such as floods, tornadoes, and earthquakes, some communities and states organize special permit assistance desks where impacted people can get help.

Following major flooding, states and communities often seek technical support and assistance from FEMA to evaluate flood damage. Contact your NFIP State Coordinator or FEMA Regional Office to find out about post-disaster assistance that may be available when many damaged buildings must be evaluated. FEMA has developed a user-friendly software program, and paper forms, that can be used to help determine whether specific buildings have been substantially damaged. The software is free and is included with *Guidance on Estimating Substantial Damage Using the NFIP Residential Substantial Damage Estimator* (FEMA 311).

**2000 International Building Code®.** The IBC® covers substantial improvement and substantial damage in a number of places. First, the scope of the code is broad and includes:

- *101.2 Scope* includes alteration, movement, enlargement, replacement, and repair. Thus, activities that may qualify as substantial improvement or substantial repair are included within the scope.
- *Section 105 Permits, 105.1 Required* reinforces intended activities that are subject to the requirements of the Code, including those that enlarge, alter, repair, move, or demolish a building or structure.
- *105.2.3 Repairs* clarifies that applications for permits need not be submitted for “ordinary repairs” provided such repairs do not include certain actions that may affect the structural design and other elements.

The IBC® includes substantial improvements and restoration of substantial damage among activities listed in Section 1612.1 that are to be designed and constructed to resist the effects of flood hazards and flood loads. “Substantial improvement” and “substantial damage” are defined in Section 1612.2.

Importantly, Chapter 34 addresses existing buildings, and specific language addresses flood hazard areas:

***3402.1 Existing buildings or structures.***

*Exception: For buildings and structures in flood hazard areas established in Section 1612.3, any additions, alterations or repairs that constitute substantial improvement of the existing structure, as defined in Section 1612.2, shall comply with the flood design requirements for new construction and all aspects of the existing structure shall be brought into compliance with the requirements for new construction for flood design.*

The scope of Chapter 34 is broad, covering “the alteration, repair, addition and change of occupancy of existing structures.” These definitions are substantially the same as the NFIP definitions:

- Addition is an extension or increase in floor area or height of a building or structures.
- Alteration is any construction or renovation to an existing structure other than repair or addition.
- Repair is the reconstruction or renewal of any part of an existing building for the purpose of its maintenance.

***2000 International Residential Code™.*** The IRC™ covers substantial improvement and substantial damage in three sections:

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- AJ102.5 was inadvertently omitted from 2000 IRC™ and is included in the errata.
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- To help answer questions, FEMA prepared *Interim Guidance for State and Local Officials: Increased Cost of Compliance Coverage* (FEMA 301), available online at [www.fema.gov/mit/icc00.htm](http://www.fema.gov/mit/icc00.htm).
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- Although quite rare, some private insurance companies do provide flood coverage that is not underwritten by the federal government. Those policies often do not include standard additional coverage to help pay the increased cost of bringing a building into compliance.
- *R105.3.1.1 Substantially improved or substantially damaged existing buildings and structures* specifies that the building official shall examine applications and prepare a finding with regard to the value of the proposed work. If the value equals or exceeds 50 percent of the market value of the building, the finding is provided to the board of appeals.
  - *R112.2.1 Determination of substantial improvement in areas prone to flooding.* The board of appeals is to determine if a proposal, referred to it by the building official pursuant to R105.3.1.1, constitutes a substantial improvement (or repair of substantial damage). If the proposed work is found to be a substantial improvement or repair of substantial damage, it must meet the requirements of Section R327. Section R112.2.1 sets forth specific work that is not included in the term “substantial damage” and that need not be included in the valuation.
  - *Appendix J Existing Buildings and Structures, Section AJ102.5 Flood hazard areas* specifies that work in existing buildings is subject to the provisions of R105.3.1.1, described above.

### 3.6 Increased Cost of Compliance

The requirement to achieve compliance after substantial damage is sustained has been part of the NFIP regulations since 1974. Standard NFIP flood insurance policies issued or renewed since May 1997 include coverage called Increased Cost of Compliance. This coverage is intended to help bear at least a substantial part of the cost of bringing a flood-damaged building into compliance with the flood resistant provisions of the community’s codes and regulations. Most buildings insured under the NFIP that are declared “substantially damaged” by the community will qualify for an additional insurance claim payment of up to an amount stated in the flood insurance policy. This additional claim payment may also be used as part of the non-federal cost-share for certain federally-funded flood mitigation grants. Contact your NFIP State Coordinator to learn more about grant programs that may be available to your community.

Increased Cost of Compliance claim payments may be available for insured buildings that sustain repetitive flood losses, but only if the community has adopted a specific cumulative substantial damage provision that either meets or exceeds the definition in the standard flood insurance policy.

## **4. Community Responsibilities Under the NFIP**

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If your community participates in the NFIP, then the responsibilities described in this chapter are already being addressed, although perhaps by an office other than the building department. Worksheet B in Chapter 2 can be used to identify each department in your community that has a role in administering the current floodplain management regulations. The NFIP provides insurance and flood hazard information, and in return, states and communities agree to regulate development in flood hazard areas.

The National Flood Insurance Program was founded on the principle that managing floodplain development at the local level will lead to avoidance and minimization of future flood damage. FEMA reports convincing evidence to support this concept: Buildings that are constructed in compliance with the NFIP requirements sustain little or no damage during most floods.

When a community decides to participate in the NFIP, it accepts the responsibility to adopt, administer, and enforce floodplain management provisions that either meet or exceed the minimum NFIP requirements. Communities become partners with the Federal Emergency Management Agency. The objectives of the partnership are to reduce safety risks to people, protect the natural and beneficial functions of floodplains, to mitigate flood damage to real and personal property, and to create disaster resistant communities.

### **4.1 State or Community Modifications of the I-Codes<sup>TM</sup>**

As each state and community considers adoption of the I-Codes<sup>TM</sup>, it may also consider certain modifications. While many states require adoption of a specific building code, many also allow local amendments that may either strengthen or weaken the basic code.

If your state has adopted the I-Codes<sup>TM</sup>, check with your state building code official and your NFIP State Coordinator to determine if your state has adopted any modifications to the flood resistant provisions of the I-Codes<sup>TM</sup>.

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If your state or community amends or does not adopt the administrative provisions outlined in the IBC<sup>®</sup> (including Appendix G) and the IRC<sup>TM</sup>, then you must recapture those provisions in another ordinance. Be sure to review the remainder of Chapter 4 and Section 1.6 for an overview of community responsibilities under the NFIP.

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A modification to the flood resistant provisions of the I-Codes™ may result in a code that does not meet the minimum requirements of the NFIP. If this happens, in order to continue to participate in the NFIP, the state or community must adopt compensating provisions in a separate ordinance or regulation. Before changing any flood resistant provision of the I-Codes™, contact your NFIP State Coordinator or the appropriate FEMA Regional Office to discuss the impact of the proposed changes.

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As you compare the flood resistant provisions of the I-Codes™ to your current floodplain management regulations, you may decide to incorporate certain modifications. FEMA encourages communities to adopt higher standards, and has established the NFIP Community Rating System (CRS) to recognize the value of doing so. Section 3.3 is a brief overview of the CRS. Examples of higher standards, along with suggested language that can be included in the Ordinance for Adoption, are found in Section 3.4.

## **4.2 State-Required Floodplain Provisions**

While the NFIP represents the minimum floodplain management requirements in most communities, a number of states have laws, regulations, or state requirements that impose higher standards. Check with your NFIP State Coordinator to make sure that you have a complete list of additional state requirements, if any. These requirements will have to be included in the Ordinance for Adoption when you adopt the I-Codes™.

Some of the more common higher standards provisions imposed by states include freeboard, more restrictive floodway encroachment limits, setbacks, and factors to address erosion. Section 3.4 describes a number of options, along with sample revision language.

## **4.3 Record Keeping**

Keeping complete permit records is a key element of your community's responsibilities under the NFIP. The I-Codes™ contain specific requirements concerning record keeping:

- IBC® Section 104.7 requires retention of all official records "for the period required for retention of public records."
- The NFIP and IBC® Appendix G require that records related to development in flood hazard areas be maintained permanently and that they be available for public inspection and review. In addition to retaining permit files, many communities keep a separate log of permits issued in flood hazard areas.
- Section R104.7 of the IRC™ requires retention of official records of applications, permits and certificates issued, reports of inspections, and notices and orders issued. Such records are to be retained "for the period required for retention of public records."

**Required Certifications.** The I-Codes<sup>TM</sup> require communities to obtain and retain the certificates and documentation needed to determine that floodplain development activities are compliant, including:

- Elevation Certificates (IBC<sup>®</sup> 1612.5; IRC<sup>TM</sup> R109.1.3; and IRC<sup>TM</sup> R327.1.9),
- Floodproofing Certificates (IBC<sup>®</sup> 1612.5),
- Certification of the design of non-standard flood openings (IBC<sup>®</sup> 1612.5),
- In certain circumstances, certification of breakaway wall design (IBC<sup>®</sup> 1612.5; IRC<sup>TM</sup> R327.3.5),
- Certification of foundation design, only in flood hazard areas subject to high velocity wave action (IBC<sup>®</sup> 1612.5; IRC<sup>TM</sup> R327.3.5),
- Certification that floodway encroachments will not increase flood levels (IBC<sup>®</sup> Appendix G 103.5),
- Notifications provided to adjacent communities, the state, and FEMA for watercourse alterations (IBC<sup>®</sup> Appendix G 103.6),
- Documentation of all floodplain management variance actions, including justifications (IBC<sup>®</sup> Appendix G 105.2; IRC<sup>TM</sup> R104.7),
- Notifications provided to recipients of floodplain management variances of certain cautions (IBC<sup>®</sup> Appendix G 105.7(5); IRC<sup>TM</sup> R112.2.2(5)), and
- Copies of inspection reports for buildings located in flood hazard areas (IBC<sup>®</sup> Appendix G 103.8; IRC<sup>TM</sup> R104.7).

**Biennial Reports to FEMA.** Periodically, FEMA sends Biennial Report forms to each participating community. The information to be reported by the community, including updates of previously submitted data, helps FEMA and the states plan for technical assistance and flood map needs. FEMA is particularly interested in the number of permits issued and variances granted. Accurate record keeping is essential for a community to be able to properly complete the Biennial Report forms.

**Plan Review and Inspection Checklist.** Some communities use a checklist during plan review to verify that appropriate flood resistant provisions have been checked and are acceptable. The sample checklists included in Appendix E are designed to be transferred to the inspection staff and used to document that specific flood resistant construction details have been found to be acceptable. Use of a checklist is not required by the NFIP. However, it is a good way to document plan review and compliance.

#### **4.4 Requiring Other Permits**

The NFIP regulations specifically require that communities review proposed development to assure that all other necessary permits have been received. Such permits and approvals may need to be obtained from federal, state, or local regulatory authorities. Examples at the federal level include permitting under Section 404 of the Clean Water Act of 1972 and Section 10 of the Rivers and Harbors Act of 1899, and consultation or permitting under the Endangered Species Act of 1973. State and regional agencies may also regulate activities in flood hazard areas, including activities that impact wetlands, forestry resources, dunes, the shoreline or coastal zone, subaquatic vegetation, threatened and endangered species, navigation, and waterways.

IBC® Section 105.3.1 directs the building official to reject applications that do not conform to the requirements of pertinent laws. Although not defined, pertinent laws include applicable federal, state, or other local laws. IBC® Appendix G Section G103.2 specifically requires that proposed developments in flood hazard areas are not to be approved until applicants provide proof that other necessary permits have been granted by federal or state authorities. Coordination of multiple permits may help applicants to avoid added costs associated with differing requirements.

#### **4.5 Notifying Potentially Impacted Parties**

When an applicant proposes activities that involve alteration of a watercourse, IBC® Appendix G Section G103 specifies that the building official shall require the applicant to notify FEMA, the state, and adjacent communities. Changes to streams and rivers have the potential to significantly alter flow patterns and carrying capacities, which may adversely impact upstream, cross-stream, and downstream properties.

The NFIP regulations require that the carrying capacity of an altered watercourse be not less than that of the natural watercourse before alterations are made. Engineering analyses are required to demonstrate that this requirement is satisfied. Applicants are to submit a comparison of the existing and proposed channel capacities, a description of the proposed alterations, land use of the adjacent properties, information about adjacent property owners, and an assessment of the potential impacts.

## 4.6 Evaluating Floodway Impacts

Communities are required to prohibit any floodway encroachments, including fills, new construction, and substantial improvements, if they would cause flood levels to increase more than a designated height. The designated height limit on the allowable increase is found in the floodway tables of a community's Flood Insurance Study.

If a community decides to permit a floodway proposal that could cause an increase in the Base Flood Elevation, a Conditional Letter of Map Amendment (CLOMR) and floodway revision must be reviewed and issued by FEMA. Preliminary permit approvals should be conditioned on the applicant obtaining the CLOMR.

## 4.7 Flood Hazard Map-Related Duties

At a minimum, communities must use the Flood Insurance Rate Map (FIRM) and floodway map, if provided by FEMA, in the administration of flood resistant provisions adopted for participation in the NFIP. Flood hazard data that are available from other federal, state, or other sources may be used if FEMA has not provided a map or if detailed data are not specified, for example, in flood hazard areas without Base Flood Elevation information.

Communities must notify FEMA and the NFIP State Coordinator if they intend to adopt maps showing flood hazard areas that are larger or different than those on the FIRMs. This situation may arise if a community conducts a detailed study of an area that was not mapped by FEMA. It may also arise if the community prepares maps of flood hazard areas using criteria that are different than the minimum map specifications used by the NFIP, such as future watershed development runoff, "no-rise" floodway, or other aspect that would result in a more restrictive flood hazard area. Under these circumstances, the elevation of the flood hazard area is referred to as the Design Flood Elevation (DFE). At a minimum, the DFE equals the Base Flood Elevation, which is shown on the FIRM. Section 1.13 includes definitions of both DFE and BFE.

The "floodway" is the channel and adjacent land areas that must be reserved in order to pass the Base Flood without cumulatively increasing the water surface elevation more than a designated height, which is specified in the Flood Insurance Study. Floodways have been delineated along most waterways that were studied using detailed methods.

Some flood hazard areas were mapped by FEMA without detailed studies. Known as "unnumbered A zones", they are shown without Base Flood Elevations. A valuable resource document, *Managing Floodplain Development in Approximate Zone A Areas: A Guide for Obtaining and Developing Base (100-Year) Flood Elevations* (FEMA 265) is online at [www.fema.gov/mit/zonea\\_mn.pdf](http://www.fema.gov/mit/zonea_mn.pdf).

Participating communities are expected to:

- *Participate in studies to produce or revise the maps.* For the most part, flood-prone communities have some level of map issued by FEMA. From time to time, waterways are restudied or new studies are conducted in areas without detailed flood elevation data.
- *Adopt revisions issued by FEMA.* A change to an effective NFIP map is called a “map revision.” The effective map is the most recent map. When a map revision is warranted, FEMA will revise and republish the affected map panels and, if necessary, the Flood Insurance Study report. This is referred to as a “physical map revision.” If the scale of the revision is small, or if it affects only one property, FEMA will issue a “Letter of Map Revision” (LOMR). A LOMR describes the changes and officially revises the effective map.
- *Retain all versions of the maps.* The most recent map, called the effective map, is to be used to regulate development in flood hazard areas. Previous versions of the map should be retained for historical purposes and in the event permit or enforcement decisions need to be reconstructed.
- *Allow for public access to the maps.* Flood hazard maps serve multiple purposes. They are the basis for mortgage lenders requiring flood insurance and insurance agents use them to determine insurance rates. Citizens should have ready access to the maps so they can better understand flood risks and the implications of decisions regarding permits and flood insurance.
- *Notify FEMA when revisions are needed.* FEMA should be notified when a community becomes aware of a significant need for a change to the flood hazard maps.

The following functions are related to FEMA’s efforts to keep maps current to reflect changes in conditions:

- *Community boundaries.* Most FIRMs are issued for individual communities, and the areas shown are those within the corporate boundaries at the time the map was prepared. Over time, FEMA will convert FIRMs to digital media and will issue them on a “county-wide” basis rather than individual towns, cities, and the unincorporated areas of counties.
- *Engineering analyses.* Applications for permits for certain proposed activities, such as flood control structures, waterway alterations, or fill for multiple lots, are to be supported with documented analyses. FEMA reviews the analyses to determine whether the proposals meet the criteria for a map revision. FEMA’s initial comments are known as “conditional determinations” that are issued as “Conditional Letters of Map Revision” (CLOMR) and “Conditional Letters of

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To help applicants gather and complete the data necessary for map changes, FEMA developed application and certification forms, accessible online through the Forms

Page at  
[www.fema.gov/mit/  
tsd/FRM\\_main.htm](http://www.fema.gov/mit/tsd/FRM_main.htm).  
Additional detailed guidance on all of the map change processes is found in *Appeals, Revisions, and Amendments to NFIP Maps: A Guide for Community Officials* (FEMA FIA-12).

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Map Revision Based on Fill” (CLOMR-F). When a project is completed, “as-builts” are submitted to support FEMA’s issuance of a final Letter of Map Amendment (LOMA) or a map revision.

- *Flood fringe fills (individual lots).* If individual lots are filled so that the buildable surface is at or above the BFE or DFE, owners may submit documentation and request that FEMA remove the flood hazard area designation. If the fill meets certain criteria, FEMA will issue a “Letter of Map Revision based on Fill” (LOMR-F). Without the LOMR-F, lenders will require that flood insurance be purchased on buildings that, based on the FIRM, appear to be within the mapped flood hazard area.
- *Naturally high ground (individual lots).* Because of the scale of the original topography and the approximate nature of flood hazard mapping techniques, some land areas may have been inadvertently included in the mapped flood hazard area. Land owners may submit documentation to show that an individual structure and/or a legally described parcel of land is above the BFE. FEMA will issue a “Letter of Map Amendment” (LOMA) if it is determined that the parcel of land is actually above the BFE. The LOMA applies to only the described structure or parcel, and officially amends the effective map.

## 4.8 Elevation Certificates

Certain ground and building elevations are to be surveyed and certified so that building officials can determine the elevation of the lowest floor. The lowest floor elevation is the most significant element in determining that floodplain construction is compliant. The same elevation certification is used by insurance agents to determine appropriate insurance ratings.

Ideally, the elevations are checked when the lowest floor level is set and before further vertical construction takes place. That way, errors in the elevation can be corrected with minimal cost and delay. Because the building official’s determination of the “lowest floor” is, in part, dependent on the location of utilities and the final site grading, a final Elevation Certificate should be completed and sealed when that work is finished.

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Many communities attach a blank Elevation Certificate to the issued permit and clearly indicate when it must be completed and submitted. A form that differs from FEMA’s Elevation Certificate may be used, but at a minimum, the same information is to be collected.

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The Elevation Certificate (FEMA Form 81-31) can be ordered from FEMA. It is available online in the library section of FEMA's Web site, [www.fema.gov/library/elvcert.pdf](http://www.fema.gov/library/elvcert.pdf). The form includes several pages of instructions and illustrations.

- *Surveyor/Engineer.* A registered professional who is licensed to perform elevation surveys is required to complete, sign, and affix a professional seal to the Elevation Certificate. The certificate must be dated to document when the elevations were surveyed because continuing construction or future modifications could alter and/or outdated the information shown. The registered professional is responsible for obtaining and certifying accurate elevations of key ground and building elevations.

Using the diagrams provided by FEMA, the registered professional determines which building elevations to survey by selecting the building diagram that most closely represents the actual building. If the diagrams do not match the configuration of the building, the registered professional may need to note in the comment section to clarify the diagram selected. The Elevation Certificate and building diagrams specify the various elevations that are to be surveyed, including:

- The bottom floor and the next higher floor;
- The floor of enclosures, attached garages, below-grade areas, and the interior grade of crawl spaces;
- For buildings in flood hazard areas subject to high velocity wave action, the top of floors and the bottom of the lowest horizontal structural members;
- For all buildings, the highest and lowest adjacent grades; and
- For buildings with enclosures with flood vents, the number and total area of vents that are within 12 inches of the adjacent grade are to be noted on the certificate.

- *Building Official.* The issued building permit should clearly specify the Design Flood Elevation and the minimum elevation of the lowest floor (including basement). When an Elevation Certificate is submitted by a registered design professional, it is the building official's responsibility to determine that all required surveyed elevations and information are noted on the "as-built" certification.

If all the required elevations have been surveyed, the building official then determines which level is the lowest floor and compares its "as-built" elevation to the DFE. This comparison determines whether the building is compliant with the flood resistant provisions of the code. If not compliant, enforcement action should be initiated immediately.

In determining the lowest floor, two factors should be kept in mind:

- In flood hazard areas not subject to wave action (A Zones), if an enclosed area below an elevated building has flood openings, has flood resistant materials, and if it is used only for parking, building access, or storage, then it is not considered the “lowest floor,” and
- In areas subject to high velocity wave action (V Zones), if an enclosed area beneath an elevated building has breakaway walls, flood resistant materials, and is used only for parking, building access, or storage, then it is not considered the “lowest floor.”

A copy of the Elevation Certificate is to be placed in the community’s permanent permit file. To facilitate reporting to FEMA and states, some communities keep a separate log with information on flood hazard area permits. At a later date, if an Elevation Certificate is not found in the file, the community will be required to obtain a replacement to verify proper administration of the NFIP requirements.

## 4.9 Inspections

Even when building permits and construction plans are complete, good inspection and enforcement procedures are important. Building inspectors need to understand the flood resistant design and construction requirements that they are to check. If deviations from the conditions of the permit are found early during construction, it is easier to work with the owner and builder to achieve compliance through corrective actions.

Using a plan review and inspection checklist, such as the examples in Appendix E, can make inspections easier because the inspector will have a standardized summary of requirements that are not seen in non-floodplain buildings. A checklist also documents the inspection, which can be important for maintaining a community’s good standing in the NFIP.

The following summarizes some of the inspections that can be performed to facilitate compliance with flood resistant provisions:

- *Stake Out or Site Inspection.* Checking that the lowest floor is properly elevated is easiest if there is a nearby elevation benchmark or reference mark. If one of the reference marks shown on the flood hazard map is not close to the site, placement of a temporary reference mark on-site can make it easier to check the elevation when the floor level is set, and to certify the elevation when the “as-built”

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Certain other certifications may be required:

- *Floodproofing Certificate*, for certain non-residential buildings designed to be watertight.
  - *Pile or column certification*, for buildings in flood hazard areas subject to high velocity wave action.
  - *Breakaway wall certification*, only if anticipated loads exceed certain values set forth in the code.
  - *Flood opening certification*, if flood openings do not conform to specifications in the code.
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Elevation Certificate is completed. The best time to make sure a building will be located correctly is during the site inspection when setbacks and distances from the watercourse or floodway can be checked.

- *Fill Inspection.* Fill that is placed to structurally support a building should be inspected to check compaction. It is also important to check that the final elevation of the fill is as high as required by the permit because this may affect the final elevation of the lowest floor.
- *Footing or Foundation Inspection.* For foundations that will create enclosures below otherwise elevated buildings, inspectors should check for the specified number, size, and location of flood openings. Flood openings are to be close to the ground and should not be confused with under-floor air ventilation openings which are located just under the floor level. For slab-on-grade buildings, the lowest floor inspection is conducted at this time.
- *Lowest Floor Inspection.* Under IBC® Section 109.3 Inspections, and IRC™ R109.1.3 Floodplain Inspections, the certification of the lowest floor elevation is to be submitted. An important part of administering provisions for flood resistant construction is making sure that buildings are elevated properly. The best time to verify compliance is when the lowest floor elevation is set and before further vertical construction takes place. An error of a foot or two in elevation may seem minor, but correction can be expensive and complicated if that error is discovered once the walls and roof are in place.
- *Final Inspection.* A final inspection to document compliance with the floodplain management requirements of the I-Codes™ can be done at the same time as the final inspection to issue the occupancy certificate. During the final inspection, some of the important things to check include:
  - Verify that utilities and other building elements are located properly, usually above the BFE or DFE. Frequently overlooked items include electrical outlets, plumbing fixtures, and ductwork that are installed under the floor, usually in a crawl space.
  - In flood hazard areas not subject to high velocity wave action (A Zones), inspect enclosures below elevated buildings to ensure the flood openings are correct in number, size, and placement. If standard air ventilation units are used as flood vents, the louvers should be permanently disabled so that floodwater can automatically enter and exit freely, without any human intervention.

- In flood hazard areas subject to high velocity wave action (V Zones), inspect enclosures below elevated buildings to determine that breakaway walls are constructed to freely break away without causing damage to the building's foundation or the elevated portion of the building. To minimize transfer of loads during flood conditions, utility connections shall not be mounted on, or penetrate through, breakaway walls.
  - For enclosed areas below the BFE or DFE, check that the approved use (parking, storage, and building access) appears to be consistent with what has been built.
  - Check that exterior fill is placed according to the approved plans and specifications, and that next to all sides of the foundation it is not higher than the interior slab or grade of crawl spaces.
  - Verify that flood damage resistant materials are used below the DFE. Refer to FEMA Technical Bulletin *Flood-Resistant Material Requirements for Buildings Located in Special Flood Hazard Areas* (FEMA FIA-TB #2).
  - Examine building support utilities to determine if they have been elevated or otherwise installed according to plans to resist flood damage.
  - Collect the “as-built” Elevation Certificate prior to the final sign-off.
  - If used, complete and sign the plan review and inspection checklist and place all inspection reports in the permit file.
- *Post-Damage Inspections.* After a flood or any event that causes significant damage, buildings located in flood hazard areas should be inspected. Some communities distribute flyers explaining permit requirements and how future flood damage can be reduced during the repair process. Most homeowners do not realize that they may need permits to repair and restore damaged buildings if they are in flood hazard areas. Damage that may meet the “substantial damage” definition must be addressed in accordance with the applicable provisions of the I-Codes™ (see Section 3.5).

## 4.10 Enforcement and Violations

Proper enforcement of the floodplain management provisions is a critical part of a community’s responsibility under the NFIP. During construction, violations of these provisions are to be resolved as soon as possible after discovery and before further construction takes place. What may appear to be a minor violation could end up being expensive when the owner purchases NFIP flood insurance. A community’s standing in the NFIP depends on making a good faith effort to successfully resolve

violations. By allowing any violation to go unresolved, the community may set a precedent, making it more difficult to take future enforcement actions.

Perhaps one of the more persuasive arguments for adopting the I-Codes™ is to consolidate enforcement authority for flood resistant design and construction provisions. The building department typically has mechanisms in place to aggressively handle code violations, while planning and zoning departments may not.

#### **4.11 The Variance Process**

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Communities are encouraged to consult with either the NFIP State Coordinator or the appropriate FEMA Regional Office prior to issuing a variance from the floodplain management provisions.

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Even if allowed by a properly issued variance, NFIP flood insurance on a building that is only one or two feet below the BFE may cost two to three times more than if the lowest floor of the building is at the minimum elevation.

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For the purposes of the NFIP, a variance is a grant of relief from the application of the NFIP floodplain management requirements. A variance allows construction in a manner that is otherwise prohibited. Variances are granted for floodplain management purposes only. A community may issue a variance to allow a building to be constructed at variance to the minimum NFIP provisions, but NFIP flood insurance will still be rated according to risk and might be prohibitively expensive.

The primary goals of the flood resistant provisions of the code are to reduce damage, and to protect public health and safety for the entire community. Achieving these goals also results in disaster resistant, more livable communities. Very few variances to the floodplain management provisions can be justified. A variance should not be granted if a proposed activity increases the susceptibility of buildings and people to flooding and flood damage.

As a guiding principle, a variance should pertain to the unique characteristics of the land itself. A properly issued variance may be granted for a parcel of land with physical characteristics so unusual that complying with the code would create an exceptional hardship for the applicant. A variance should not be granted based on the personal circumstances of an individual.

**The 2000 International Building Code®.** Section 112 creates a board of appeals to hear and decide appeals of orders, decisions, or determinations made by the building official. Specific requirements, considerations, and conditions for issuing variance from floodplain management requirements can be found in Appendix G Section 105.

**The 2000 International Residential Code<sup>TM</sup>**. Section R112 creates a board of appeals to hear appeals of orders, decisions, or determinations made by the building official. The board of appeals has specific responsibilities related to flood hazard area development:

- R112.2.1 requires the board of appeals to evaluate the building official's finding regarding the value of proposed improvements to existing buildings to determine if the work constitutes a substantial improvement, and
- R112.2.2 sets forth specific criteria, consistent with the minimum NFIP requirements, to be applied in the review and consideration of variances to the minimum flood hazard area criteria.



## **Appendix A. References and Online Resources**

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FEMA publications and forms may be obtained at no cost. These and other materials may also be available online at <http://www.fema.gov/library/lib06.htm>.

Online versions of FEMA forms are available at <http://www.fema.gov/library/frms.htm>.

*Hardcopy publications and forms may be ordered from:*

Federal Emergency Management Agency  
P.O. Box 2012  
Jessup, Maryland 20794-2012  
Toll free: 1-800-480-2520

APA PAS #473, *Subdivision Design in Flood Hazard Areas*.  
Washington, DC: American Planning Association, 1997.

ASCE 7-98, *Minimum Design Loads for Buildings and Other Structures*.  
Reston, Virginia: American Society of Civil Engineers, 1998.

ASCE 24-98, *Flood Resistant Design and Construction*. Reston,  
Virginia: American Society of Civil Engineers, 1998.

ASFPM and Federal Interagency Floodplain Management Task Force,  
*Addressing Your Community's Flood Problems: A Guide for Elected  
Officials*. Madison, Wisconsin: Association of State Floodplain  
Managers, Inc., 1996.

FEMA, 44 CFR, Part 59-60, *National Flood Insurance Program*.  
Washington, DC: Federal Emergency Management Agency, 1990.

FEMA Federal Insurance Administration, *Code Compatibility Report*.  
Washington, DC: Federal Emergency Management Agency, 1992.

FEMA EMI IS-9, *Managing Floodplain Development Through the NFIP*  
(independent study course). Emmitsburg, Maryland: Federal Emergency  
Management Agency, Emergency Management Institute, 2000.

FEMA FIA-12, *Appeals, Revisions, and Amendments to NFIP Maps: A Guide for Community Officials*. Washington, DC: Federal Emergency Management Agency, Federal Insurance Administration, 1993.

FEMA FIA-15A, *CRS Application*. Washington, DC: Federal Emergency Management Agency, Federal Insurance Administration, 1999.

FEMA 55, *Coastal Construction Manual*. Washington, DC: Federal Emergency Management Agency, 2000.

FEMA 85, *Manufactured Home Installation in Flood Hazard Areas*. Washington, DC: Federal Emergency Management Agency, 1985.

FEMA 213, *Answers to Questions About Substantially Damaged Buildings*. Washington, DC: Federal Emergency Management Agency, 1991.

FEMA 259, *Engineering Principles and Practices for Retrofitting Flood Prone Residential Buildings*. Washington, DC: Federal Emergency Management Agency, 1995.

FEMA 265, *Managing Floodplain Development in Approximate Zone A Areas: A Guide for Obtaining and Developing Base (100-Year) Flood Elevations*. Washington, DC: Federal Emergency Management Agency, 1995. Available online at [www.fema.gov/mit/zonea\\_mn.pdf](http://www.fema.gov/mit/zonea_mn.pdf).

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FEMA 311, *Guidance on Estimating Substantial Damage Using the NFIP Residential Substantial Damage Estimator*. Washington, DC: Federal Emergency Management Agency, 1998.

FEMA 312, *Homeowner's Guide to Retrofitting: Six Ways to Protect Your House from Flooding*. Washington, DC: Federal Emergency Management Agency, 1998.

FEMA 348, *Protecting Building Utilities From Flood Damage: Principles and Practices for the Design and Construction of Flood Resistant Building Utility Systems*. Washington, DC: Federal Emergency Management Agency, 1999.

FEMA. (1996) *Floodproofing Certificate* (FEMA Form 81-65). [Online]. Available: <http://www.fema.gov/nfip/ff81-65.pdf> [1999, December 30].

FEMA. (1999) *Elevation Certificate* (FEMA Form 81-31). [Online]. Available: <http://www.fema.gov/library/elvcert.pdf> [1999, December 30].

FEMA. (various dates) *NFIP Technical Bulletin Series*. Washington, DC: National Flood Insurance Program. [Online]. Available: <http://www.fema.gov/mit/techbul.htm>.

FEMA FIA-TB #0: *User's Guide to Technical Bulletins*. 1999.

FEMA FIA-TB #1: *Openings in Foundation Walls for Buildings Located in Special Flood Hazard Areas*. 1993.

FEMA FIA-TB #2: *Flood-Resistant Material Requirements for Buildings Located in Special Flood Hazard Areas*. 1993.

FEMA FIA-TB #3: *Non-Residential Floodproofing – Requirements and Certification for Buildings Located in Special Flood Hazard Areas*. 1993.

FEMA FIA-TB #4: *Elevator Installation for Buildings Located in Special Flood Hazard Areas*. 1993.

FEMA FIA-TB #5: *Free of Obstruction Requirements for Buildings Located in Coastal High Hazard Areas*. 1993.

FEMA FIA-TB #6: *Below Grade Parking Requirements for Buildings Located in Special Flood Hazard Areas*. 1993.

FEMA FIA-TB #7: *Wet Floodproofing Requirements for Structures Located in Special Flood Hazard Areas*. 1993.

FEMA FIA-TB #8: *Corrosion Protection for Metal Connectors in Coastal Areas for Structures Located in Special Flood Hazard Areas*. 1996.

FEMA FIA-TB #9: *Design and Construction Guidance for Breakaway Walls Below Elevated Coastal Buildings*. 1999.

IBC 2000, *2000 International Building Code*<sup>®</sup>. Falls Church, Virginia: International Code Council, Inc., 2000.

IFGC 2000, *2000 International Fuel Gas Code*<sup>®</sup>. Falls Church, Virginia: International Code Council, Inc., 2000.

IMC 2000, *2000 International Mechanical Code*<sup>®</sup>. Falls Church, Virginia: International Code Council, Inc., 1999.

IPC 2000, *2000 International Plumbing Code*<sup>®</sup>. Falls Church, Virginia: International Code Council, Inc., 2000.

IPSDC 2000, *2000 International Private Sewage Disposal Code*<sup>®</sup>. Falls Church, Virginia: International Code Council, Inc., 2000.

IRC 2000, *2000 International Residential Code*<sup>TM</sup>. Falls Church, Virginia: International Code Council, Inc., 2000.

National Evaluation Service, Inc., *Evaluation Plan for Determination of Flood-Resistance of Building Elements*. April 2000.

## **Appendix B. Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IBC®**

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## Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IBC®.

NFIP Regulations	IBC® 2000 and Appendix G
<b>Sec. 59.1 Definitions</b>	
<b>BASE FLOOD.</b> Base flood means the flood having a one percent chance of being equaled or exceeded in any given year.	<b>BASE FLOOD.</b> The flood having a 1 percent chance of being equaled or exceeded in any given year. <b>BASE FLOOD ELEVATION.</b> The elevation of the base flood, including wave height, relative to the National Geodetic Vertical Datum (NGVD), North American Vertical Datum (NAVD) or other datum specified on the flood insurance rate map (FIRM).
<b>BASEMENT.</b> Any area of the building having its floor subgrade (below ground level) on all sides.	<b>BASEMENT.</b> The portion of a building having its floor subgrade (below ground level) on all sides.
[Not defined in the NFIP regulations.]	<b>DESIGN FLOOD.</b> The flood associated with the greater of the following two areas: 1. Area with a floodplain subject to a 1 percent or greater chance of flooding in any year, or 2. Area designated as a flood hazard area on a community's flood hazard map, or otherwise legally designated.
[Not defined in the NFIP regulations.]	<b>DESIGN FLOOD ELEVATION.</b> The elevation of the "design flood," including wave height, relative to the datum specified on the community's legally designated flood hazard map.
<b>DEVELOPMENT.</b> Any man-made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations or storage of equipment or materials.	<b>101.2 Scope</b> <b>105.1 Permits required</b> <b>105.2 Work exempt from permit</b>
<b>See FLOODPROOFING.</b>	<b>Appendix G. DEVELOPMENT.</b> Any man-made change to improved or unimproved real estate, including but not limited to buildings or other structures, temporary or permanent storage of materials, mining, dredging, filling, grading, paving, excavations, operations and other land disturbing activities.
	<b>DRY FLOODPROOFING.</b> A combination of design modifications that result in a building or structure, including the attendant utility and sanitary facilities, being watertight with walls substantially impermeable to the passage of water and with structural components having the capacity to resist loads as identified in ASCE 7.
	<b>EXISTING CONSTRUCTION (EXISTING STRUCTURES).</b> For the purposes of determining rates, structures for which the "start of construction" commenced before the effective date of the FIRM or before January 1, 1975, for FIRMs effective before that date. "Existing construction" may also be referred to as "existing structures."
	<b>FLOOD or FLOODING.</b> (a) A general and temporary condition of partial or complete inundation of normally dry land from: 1. The overflow of inland or tidal waters. 2. The unusual and rapid accumulation or runoff of surface waters from any source.

## Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IBC®.

NFIP Regulations	IBC® 2000 and Appendix G
[Not defined in the NFIP regulations.]	
[Not defined in the NFIP regulations.]	
	<b>FLOOD DAMAGE RESISTANT MATERIALS.</b> Any construction material capable of withstanding direct and prolonged contact with floodwaters without sustaining any damage that requires more than cosmetic repair.
	<b>FLOOD HAZARD AREA.</b> The greater of the following two areas:
	1. The area within a floodplain subject to a 1 percent or greater chance of flooding in any year.
	2. The area designated as a flood hazard area on a community's flood hazard map, or otherwise legally designated.
	<b>FLOOD HAZARD AREA SUBJECT TO HIGH VELOCITY WAVE ACTION.</b> Area within the flood hazard area which is subject to high velocity wave action, and shown on a Flood Insurance Rate Map or other flood hazard map as Zone V, VO, or V1-30.
	<b>FLOOD INSURANCE RATE MAP (FIRM).</b> An official map of a community on which the Federal Emergency Management Agency has delineated both the special flood hazard areas and the risk premium zones applicable to the community.
	<b>FLOOD INSURANCE STUDY</b> (see FLOOD ELEVATION STUDY). An examination, evaluation and determination of flood hazards and, if appropriate, corresponding water surface elevations, or an examination, evaluation and determination of mudslide (i.e., mudflow) and/or flood-related erosion hazards.
	<b>FLOODWAY – See REGULATORY FLOODWAY.</b>
	<b>FUNCTIONALLY DEPENDENT USE.</b> A use which cannot perform its intended purpose unless it is located or carried out in close proximity to water. The term includes only docking facilities, port facilities, that are necessary for the loading and unloading of cargo or passengers, and ship building and ship repair facilities, but does not include long-term storage or related manufacturing facilities.
	<b>HISTORIC STRUCTURE.</b>
	(a) Listed individually in the National Register of Historic Places (a listing maintained by the Department of Interior) or preliminarily determined by the Secretary of the Interior as meeting the requirements for individual listing on the National Register;
	(b) Certified or preliminarily determined by the Secretary of the Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined by the Secretary to qualify as a registered historic district;
	<b>HISTORIC BUILDINGS.</b> Buildings which are listed in or eligible for listing in the National Register of Historic Places, or designated as historic under an appropriate state or local law. See Section 3405.

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## Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IBC®.

NFIP Regulations	IBC® 2000 and Appendix G
<b>HISTORIC STRUCTURE, continued:</b> <ul style="list-style-type: none"> <li>(c) Individually listed on a state inventory of historic places in states with historic preservation programs which have been approved by the Secretary of the Interior; or</li> <li>(d) Individually listed on a local inventory of historic places in communities with historic preservation programs that have been certified either.           <ul style="list-style-type: none"> <li>(1) By an approved state program as determined by the Secretary of the Interior or</li> <li>(2) Directly by the Secretary of the Interior in states without approved programs.</li> </ul> </li> </ul>	<b>LOWEST FLOOR.</b> The floor of the lowest enclosed area (including basement). An unfinished or flood resistant enclosure, usable solely for parking of vehicles, building access or storage in an area other than a basement area, is not considered a building's lowest floor; provided, that such enclosure is not built so as to render the structure in violation of the applicable non-elevation design requirements of Sec. 60.3.
	<b>MANUFACTURED HOME.</b> A structure, transportable in one or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when attached to the required utilities. The term "manufactured home" does not include a "recreational vehicle."
	<b>MANUFACTURED HOME PARK OR SUBDIVISION.</b> A parcel (or contiguous parcels) of land divided into two or more manufactured home lots for rent or sale.
	<b>RECREATIONAL VEHICLE.</b> A vehicle which is. <ul style="list-style-type: none"> <li>(a) built on a single chassis;</li> <li>(b) 400 square feet or less when measured at the largest horizontal projection;</li> <li>(c) designed to be self-propelled or permanently towable by a light duty truck; and</li> <li>(d) designed primarily not for use as a permanent dwelling but as temporary living quarters for recreational, camping, travel, or seasonal use. A recreational vehicle is ready for highway use if it is on its wheels or jacking system, is attached to the site only by quick disconnect type utilities and security devices, and has no permanently attached additions.</li> </ul>

## Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IBC®.

NFIP Regulations	IBC® 2000 and Appendix G
<b>REGULATORY FLOODWAY.</b> The channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.	See FLOODWAY.
<b>REMEDY A VIOLATION.</b> to bring the structure or other development into compliance with State or local flood plain management regulations, or, if this is not possible, to reduce the impacts of its noncompliance. Ways that impacts may be reduced include protecting the structure or other affected development from flood damages, implementing the enforcement provisions of the ordinance or otherwise deferring future similar violations, or reducing Federal financial exposure with regard to the structure or other development.	<p><b>113 Violations</b></p> <p><b>Appendix G101.4. VIOLATIONS.</b> Any violation of a provision of this appendix, or failure to comply with a permit or variance issued pursuant to this appendix or any requirement of this appendix, shall be handled in accordance with Section 113.</p>
<b>SPECIAL HAZARD AREA.</b> Area of special flood hazard is the land in the flood plain within a community subject to a one percent or greater chance of flooding in any given year. The area may be designated as Zone A on the FHBM. After detailed ratemaking has been completed in preparation for publication of the flood insurance rate map, Zone A usually is refined into Zones A, AO, AH, A1-30, AE, A99, AR, ARA1-30, AR/AE, AR/AO, AR/AH, AR/A, VO, or V1-30, VE, or V. For purposes of these regulations, the term "special flood hazard area (SFHA)" is synonymous in meaning with the phrase "area of special flood hazard."	<p><b>SPECIAL FLOOD HAZARD AREA.</b> The land area subject to flood hazards and shown on a Flood Insurance Rate Map or other flood hazard map as Zone A, AE, A1-30, A99, AR, AO, AH, V, VO, VE, or V1-30.</p>
<b>START OF CONSTRUCTION.</b> Construction (for other than new construction or substantial improvements under the Coastal Barrier Resources Act (Pub. L. 97-348)), includes substantial improvement, and means the date the building permit was issued, provided the actual start of construction, repair, reconstruction, rehabilitation, addition placement, or other improvement was within 180 days of the permit date. The actual start means either the first placement of permanent construction of a structure on a site, such as the pouring of slab or footings, the installation of piles, the construction of columns, or any work beyond the stage of excavation; or the placement of a manufactured home on a foundation. Permanent construction does not include land preparation, such as clearing, grading and filling; nor does it include the installation of streets and/or walkways; nor does it include excavation for a basement, footings, piers, or foundations or the erection of temporary forms; nor does it include the installation on the property of accessory	<p><b>START OF CONSTRUCTION.</b> The date of permit issuance for new construction and substantial improvements to existing structures, provided the actual start of construction, repair, reconstruction, rehabilitation, addition placement, or other improvement is within 180 days after the date of issuance. The actual start of construction means the first placement of permanent construction of a building (including a manufactured home) on a site, such as the pouring of a slab or footings, installation of pilings or construction of columns.</p> <p>Permanent construction does not include land preparation (such as clearing, excavation, grading, or filling), or the installation of streets or walkways, or excavation for a basement, footings, piers or foundations, or the erection of temporary forms, or the installation of accessory buildings such as garages or sheds not occupied as dwelling units or not part of the main building. For a substantial improvement, the actual "start of construction" means the first alteration of any wall, ceiling, floor, or other structural part of a building, whether or not that alteration affects the external dimensions of the building.</p>

## Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IBC®.

NFIP Regulations	IBC® 2000 and Appendix G
<p><b>START OF CONSTRUCTION</b>, continued:</p> <p>units or not part of the main structure. For a substantial improvement, the actual start of construction means the first alteration of any wall, ceiling, floor, or other structural part of a building, whether or not that alteration affects the external dimensions of the building.</p>	<p><b>STRUCTURE.</b> For flood plain management purposes, a walled and roofed building, including a gas or liquid storage tank, that is principally above ground, as well as a manufactured home.</p> <p>"Structure" for insurance coverage purposes, means a walled and roofed building, other than a gas or liquid storage tank, that is principally above ground and affixed to a permanent site, as well as a manufactured home on a permanent foundation. For the latter purpose, the term includes a building while in the course of construction, alteration or repair, but does not include building materials or supplies intended for use in such construction, alteration or repair, unless such materials or supplies are within an enclosed building on the premises.</p> <p><b>SUBSTANTIAL DAMAGE.</b> Damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.</p>
	<p><b>SUBSTANTIAL DAMAGE.</b> Damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.</p> <p><b>SUBSTANTIAL IMPROVEMENT.</b> Any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure before the "start of construction" of the improvement. This term includes structures which have incurred "substantial damage", regardless of the actual repair work performed. The term does not, however, include either:</p> <ol style="list-style-type: none"> <li>(1) Any project for improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions;</li> <li>(2) Any alteration of a historic structure, provided that the alteration will not preclude the structure's continued designation as a "historic structure."</li> </ol>

## Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IBC®.

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<b>VARIANCE.</b> A grant of relief by a community from the terms of a flood plain management regulation.	<p><b>104.10 Modifications</b>  <b>104.11 Alternative materials, design and methods of construction and equipment.</b> [In flood hazard areas, modifications require a formal variance.]</p> <p><b>Appendix G. VARIANCE.</b> A grant of relief from the requirements of this section which permits construction in a manner otherwise prohibited by this section where specific enforcement would result in unnecessary hardship.</p>
<b>VIOLATION.</b> The failure of a structure or other development to be fully compliant with the community's flood plain management regulations. A structure or other development without the elevation certificate, other certifications, or other evidence of compliance required in Sec. 60.3(b)(5), (c)(4), (c)(10), (d)(3), (e)(2), (e)(4), or (e)(5) is presumed to be in violation until such time as that documentation is provided.	<p><b>113 Violations</b></p> <p><b>Appendix G. VIOLATION.</b> A development that is not fully compliant with this appendix or Section 1612 , as applicable</p>
59.22 [This section outlines actions to be taken by communities to be eligible for the National Flood Insurance Program, including application procedures, documentation requirements, and a commitment to fulfill certain functions and responsibilities.]	<p><b>104.7 Department Records</b></p> <p><b>Appendix G103.8 Records.</b> The building official shall maintain a permanent record of all permits issued in flood hazard areas, including copies of inspection reports and certifications required in Section 1612.</p>
<p><b>1</b> (a)(9)(iii) Maintain for public inspection and furnish upon request certificates of elevation and certificates of floodproofing.</p> <p><b>2</b> (b)(1) Appoint the agency or official with the responsibility, authority, and means to implement the commitments, including certain reporting requirements.</p>	<p><b>103 Department of Building Safety</b></p> <p><b>104 Duties and Powers of the Building Official</b></p> <p><b>Appendix G104.3 Validity of permit.</b> The issuance of a permit under this appendix shall not be construed to be a permit for, or approval of, any violation of this appendix or any other ordinance of the jurisdiction. The issuance of a permit based on submitted documents and information shall not prevent the building official from requiring the correction of errors. The building official is authorized to prevent occupancy or use of a structure or site which is in violation of this appendix or other ordinances of this jurisdiction.</p> <p><b>Appendix G104.4 Expiration.</b> A permit shall become invalid if the proposed development is not commenced within 180 days after its issuance, or if the work authorized is suspended or abandoned for a period of 180 days after the work commences. Extensions shall be requested in writing and justifiable cause demonstrated. The building official is authorized to grant, in writing, one or more extensions of time, for periods not more than 180 days each.</p> <p><b>Appendix G104.5 Suspension or revocation.</b> The building official is authorized to suspend or revoke a permit issued under this appendix wherever the permit is issued in error or on the basis of incorrect, inaccurate or incomplete information, or in violation of any ordinance or code of this jurisdiction.</p>

## Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IBC®.

NFIP Regulations		IBC® 2000 and Appendix G
<b>Sec. 60.2 Minimum compliance with flood plain management criteria.</b> [Sections (a) through (c) pertain to meeting specific criteria set forth herein, as a function of the type of flood-related hazard and the level of detail provided on the flood hazard map prepared by FEMA. Section (e) provides for coordination with State Coordinating Agencies with respect to submission of regulations for participation in the NFIP; Section (f) addresses the community function to submit reports periodically, when requested; and Section (g) directs communities to assure that their comprehensive plans are consistent with floodplain management objectives.]		<b>1612.3 Establishment of flood hazard areas.</b> To establish flood hazard areas, the governing body shall adopt a flood hazard map and supporting data. The flood hazard map shall include, at a minimum, areas of special flood hazard as identified by the Federal Emergency Management Agency in an engineering report entitled "The Flood Insurance Study for [INSERT NAME OF JURISDICTION]," dated [INSERT DATE OF ISSUANCE], as amended or revised with the accompanying Flood Insurance Rate Map (FIRM) and Flood Boundary and Floodway Map (FBFM) and related supporting data along with any revisions thereto. The adopted flood hazard map and supporting data are hereby adopted by reference and declared to be part of this section.
<b>3</b>  (h) The community shall adopt and enforce floodplain management regulations based on data provided by the Administrator. Without prior approval of the Administrator, the community shall not adopt and enforce floodplain management regulations based upon modified data reflecting natural or man-made changes.		<b>Appendix G102.2 Establishment of flood hazard areas.</b> Flood hazard areas are established in Section 1612.3 of the International Building Code, adopted by the governing body on _____.
<b>Sec. 60.3 Floodplain management criteria for flood-prone areas.</b> (a) When the Administrator has not defined the special flood hazard areas within a community, has not provided water surface elevation data, and has not provided sufficient data to identify the floodway or coastal high hazard area, but the community has indicated the presence of such hazards by submitting an application to participate in the Program, the community shall:	<b>4</b>  (1) Require permits for all proposed construction or other development, including the placement of manufactured homes, to determine whether such development is proposed within flood hazard areas; <b>continued on next page</b>	<b>101.2 Scope</b> <b>105.2 Work exempt from permit</b> <b>105.2.3 Repairs</b> <b>1612.1 General (Flood Loads).</b> Within flood hazard areas as established in Section 1612.3, all new construction of buildings, structures and portions of buildings and structures, including substantial improvements and restoration of substantial damage to buildings and structures, shall be designed and constructed to resist the effects of flood hazards and flood loads. <b>3402.1 Existing buildings or structures.</b> <b>Exception.</b> For buildings and structures in flood hazard areas established in Section 1612.3, any additions, alterations or repairs that constitutes substantial improvement of the existing structure, as defined in Section 1612.2, shall comply with the flood design requirements for new construction and all aspects of the existing structure shall be brought into compliance with the requirements for new construction for flood design.

## Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IBC®.

NFIP Regulations	IBC® 2000 and Appendix G
4 continued from previous page	<p><b>Appendix G101.1 Purpose.</b> The purpose of this appendix is to promote the public health, safety, and general welfare and to minimize public and private losses due to flood conditions in specific flood hazard areas through the establishment of comprehensive regulations for management of flood hazard areas, designed to:</p> <ol style="list-style-type: none"> <li>1. Prevent unnecessary disruption of commerce, access, and public service during times of flooding;</li> <li>2. Manage the alteration of natural floodplains, stream channels, and shorelines;</li> <li>3. Manage filling, grading, dredging, and other development which may increase flood damage or erosion potential;</li> <li>4. Prevent or regulate the construction of flood barriers which will divert flood waters or which can increase flood hazards; and</li> <li>5. Contribute to improved construction techniques in the floodplain.</li> </ol> <p><b>Appendix G102.1 General (Applicability).</b> This appendix, in conjunction with the International Building Code, provides minimum requirements for development located in flood hazard areas, including the subdivision of land, installation of utilities, placement and replacement of manufactured homes, new construction and repair, reconstruction, rehabilitation, or additions to new construction, and substantial improvement of existing buildings and structures, including restoration after damage.</p> <p><b>Appendix G103.1 Permit applications.</b> The building official shall review all permit applications to determine whether proposed development sites will be reasonably safe from flooding. If a proposed development site is in a flood hazard area, all site development activities, including grading, filling, utility installation, and drainage modification, and all new construction and substantial improvements (including the placement of prefabricated buildings and manufactured homes) shall be designed and constructed with methods, practices, and materials that minimize flood damage and that are in accordance with this code and the ASCE 24.</p> <p><b>Appendix G104.1 Required.</b> Any person, owner or authorized agent who intends to conduct any development in a flood hazard area shall first make application to the building official and shall obtain the required permit.</p>
5	<p>(2) Review proposed development to assure that all necessary permits have been received from other governmental agencies from which approval is required by Federal or State law, including section 404 of the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. 1334;</p> <p>(3) Review all permit applications to determine whether proposed building sites will be reasonably safe from flooding. If a proposed building site is in a flood-prone area, all new construction and substantial improvements shall</p>
6 continued on next page	<p>(2) Review proposed development to assure that all necessary permits have been received from other governmental agencies from which approval is required by Federal or State law, including section 404 of the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. 1334;</p> <p>(3) Review all permit applications to determine whether proposed building sites will be reasonably safe from flooding. If a proposed building site is in a flood-prone area, all new construction and substantial improvements shall</p>

## Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IBC®.

NFIP Regulations	IBC® 2000 and Appendix G
<p><b>6</b> continued from previous page</p> <p>(i) be designed (or modified) and adequately anchored to prevent flotation, collapse, or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy,</p> <p>(ii) be constructed with materials resistant to flood damage,</p> <p>(iii) minimize flood damages, and</p> <p>(iv) be constructed with electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities that are designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding.</p> <p><b>1603.1.6 Flood load.</b> For buildings located in flood hazard areas as established in Section 1612.3, the following information, referenced to the datum on the community's flood insurance rate map (FIRM), shall be shown, regardless of whether flood loads govern the design of the building:</p> <p>(1) In flood hazard areas not subject to high-velocity wave action, the elevation of proposed lowest floor, including basement.</p> <p>(2) In flood hazard areas not subject to high-velocity wave action, the elevation to which any nonresidential building will be dry floodproofed.</p> <p>(3) In flood hazard areas subject to high velocity wave action, the proposed elevation of the lowest horizontal structural member of the lowest floor, including basement.</p> <p><b>1605.2.2 Other loads.</b> Where F, H, P or T are to be considered in design, each applicable load shall be added to the above combinations in accordance with Section 2.3.2 of ASCE 7. Where F<sub>a</sub> is to be considered in design, the load combinations of Section 2.3.3 of ASCE 7 shall be used.</p> <p><b>1605.3.1.2 Other loads.</b> Where F, H, P or T are to be considered in design, the load combinations of Section 2.4.1 of ASCE 7 shall be used. Where F<sub>a</sub> is to be considered in design, the load combinations of Section 2.4.2 of ASCE 7 shall be used.</p> <p><b>1612.4 Design and construction.</b> The design and construction of buildings and structures located in flood hazard areas, including flood hazard areas subject to high velocity wave action, shall be designed and constructed in accordance with ASCE 24.</p> <p><b>1801.1 Scope (Soils and Foundations).</b> The provisions of this chapter shall apply to building and foundation systems in those areas not subject to scour or water pressure by wind and wave action. Buildings and foundations subject to such scour or water pressure loads shall be designed in accordance with Chapter 16.</p> <p><b>3001.2 Referenced standards.</b> Except as otherwise provided for in this code, the design, construction, installation, alteration, repair and maintenance of elevators and conveying systems and their components shall conform to ASME A17.1, ASME A90.1, ASME B20.1 and ALI B 153.1, and ASCE 24 for construction in flood hazard areas as established in Section 1612.3.</p> <p><b>3102.7 Engineering design.</b> The structure shall be designed and constructed to sustain dead loads, loads due to tension or inflation, live loads including wind, snow, flood, and seismic loads and in accordance with Chapter 16.</p> <p><b>3402.1 Existing buildings or structures. Exception.</b> SEE BLOCK 4</p> <p><b>Appendix G101.1 Purpose (Flood Resistant Construction).</b> SEE BLOCK 4</p> <p><b>Appendix G101.2 Objectives.</b> The objectives of this appendix are to protect human life, minimize the expenditure of public money for flood control projects, minimize the need for rescue and relief efforts associated with flooding, minimize prolonged business interruption, minimize damage to public facilities and utilities, help maintain a stable tax base by providing for the sound use and development of flood-prone areas, contribute to improved construction techniques in the floodplain, and ensure that potential owners and occupants are notified that property is within flood hazard areas.</p>	

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<p><b>6</b> continued from previous page</p>	<p><b>Appendix G101.3 Scope.</b> The provisions of this appendix shall apply to all proposed development in a flood hazard area established in Section 1612 of this code.</p> <p><b>Appendix G104.2 Application for permit.</b> The applicant shall file an application in writing on a form furnished by the building official. Such application shall:</p> <ol style="list-style-type: none"> <li>1. Identify and describe the development to be covered by the permit.</li> <li>2. Describe the land on which the proposed development is to be conducted by legal description, street address or similar description that will readily identify and definitely locate the site.</li> <li>3. Include a site plan showing the delineation of flood hazard areas, floodway boundaries, flood zones, design flood elevations, ground elevations, proposed fill and excavation, and drainage patterns and facilities.</li> <li>4. Indicate the use and occupancy for which the proposed development is intended.</li> <li>5. Be accompanied by construction documents, grading and filling plans, and other information deemed appropriate by the building official.</li> <li>6. State the valuation of the proposed work.</li> <li>7. Be signed by the applicant or the applicant's authorized agent.</li> </ol> <p><b>Appendix G401.5 Storm drainage.</b> Storm drainage shall be designed to convey the flow of surface waters so as to minimize or eliminate damage to persons or property.</p> <p><b>Appendix G401.6 Streets and sidewalks.</b> Streets and sidewalks shall be designed to minimize potential for increasing or aggravating flood levels.</p>
<p><b>7</b></p> <p>(4) Review subdivision proposals and other proposed new development, including manufactured home parks and subdivisions, or other proposed new development in a flood hazard area shall be reviewed to assure that:</p> <ol style="list-style-type: none"> <li>1. All such proposals are consistent with the need to minimize flood damage, and</li> <li>2. All public utilities and facilities, such as sewer, gas, electric, and water systems are located and constructed to minimize or eliminate flood damage, and</li> <li>3. Adequate drainage is provided to reduce exposure to flood hazards.</li> </ol> <p><b>Appendix G301.2 Subdivision requirements.</b> The following requirements shall apply in the case of any proposed subdivision, including proposals for manufactured home parks and subdivisions, any portion of which lies within a flood hazard area:</p> <ol style="list-style-type: none"> <li>1. The flood hazard area, including floodways and areas subject to high velocity wave action, as appropriate, shall be delineated on tentative and final subdivision plats;</li> <li>2. Design flood elevations shall be shown on tentative and final subdivision plats;</li> <li>3. Residential building lots shall be provided with adequate buildable area outside the floodway; and</li> <li>4. The design criteria for utilities and facilities set forth in this appendix and appropriate International Codes shall be met.</li> </ol> <p><b>Appendix G401.5 Storm drainage.</b> SEE BLOCK 6</p>	

## Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IBC®.

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<b>8</b> (5) Require within flood-prone areas new and replacement water supply systems to be designed to minimize or eliminate infiltration of flood waters into the systems; and	<b>Appendix G401.4 Water facilities.</b> All new or replacement water facilities shall be designed in accordance with the provisions of Chapter 8, ASCE 24 to minimize or eliminate infiltration of flood waters into the systems.
<b>9</b> (6) Require within flood-prone areas (i) new and replacement sanitary sewage systems to be designed to minimize or eliminate infiltration of flood waters into the systems and discharges from the systems into flood waters and (ii) onsite waste disposal systems to be located to avoid impairment to them or contamination from them during flooding.  (b) When the Administrator has designated areas of special flood hazards (A zones) by the publication of a community's FHBM or FIRM, but has neither produced water surface elevation data nor identified a floodway or coastal high hazard area, the community shall:	<b>Appendix G401.3 Sewer facilities.</b> All new or replaced sanitary sewer facilities, private sewer treatment plants (including all pumping stations and collector systems) and onsite waste disposal systems, shall be designed in accordance with Chapter 8, ASCE 24 to minimize or eliminate infiltration of flood waters into the facilities and discharge from the facilities into flood waters, or impairment of the facilities and systems.  [Prior provisions cumulative]
<b>10</b> (1) Require permits for all proposed construction and other developments including the placement of manufactured homes, within Zone A on the community's FHBM or FIRM; (2) Require the application of the standards in paragraphs (a) (2), (3), (4), (5) and (6) of this section to development within Zone A on the community's FHBM or FIRM;	<b>Appendix G103.3 Determination of design flood elevations.</b> If design flood elevations are not specified, the building official is authorized to require the applicant to: 1. Obtain, review and reasonably utilize data available from a federal, state or other source, or 2. Determine the design flood elevation in accordance with accepted hydrologic and hydraulic engineering techniques. Such analyses shall be undertaken by a professional engineer licensed in this state who shall certify that the technical methods used reflect currently accepted engineering practice. Studies, analyses, and computations shall be submitted in sufficient detail to allow thorough review and approval by the building official. The accuracy of data submitted for such determination shall be the responsibility of the applicant.
<b>11</b> (3) Require that all new subdivision proposals and other proposed developments (including proposals for manufactured home parks and subdivisions greater than 50 lots or 5 acres, whichever is the lesser, include within such proposals base flood elevation data;	

## Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IBC®.

NFIP Regulations	IBC® 2000 and Appendix G
<b>12</b>  (4) Obtain, review and reasonably utilize any base flood elevation and floodway data available from a Federal, State, or other source, including data developed pursuant to paragraph (b)(3) of this section, as criteria for requiring that new construction, substantial improvements, or other development in Zone A on the community's FHBMs or FIRM meet the standards in paragraphs (c)(2), (c)(3), (c)(5), (c)(6), (c)(12), (c)(14), (d)(2) and (d)(3) of this section;	<b>1612.3 Establishment of flood hazard areas.</b> SEE BLOCK 3  <b>Appendix G103.3 Determination of design flood elevations.</b> SEE BLOCK 11
<b>13</b>  (5) Where base flood elevation data are utilized, within Zone A on the community's FHBMs or FIRMs. (i) Obtain the elevation (in relation to mean sea level) of the lowest floor (including basement) of all new and substantially improved structures, and (ii) Obtain, if the structure has been floodproofed in accordance with paragraph (c)(3)(ii) of this section, the elevation (in relation to mean sea level) to which the structure was floodproofed, and (iii) Maintain a record of all such information with the official designated by the community under Sec. 59.22 (a)(9)(iii);	<b>104.7 Department records</b> <b>109.3.3 Lowest floor elevation.</b> The elevation certification required in Section 1612.5 shall be submitted to the code official. <b>1612.5 Flood hazard certificates.</b> The following certifications shall be submitted to the building official: 1. For construction in flood hazard areas not subject to high velocity wave action: 1.1 As part of the lowest floor elevation inspection required in Section 109.3.3, certification of the elevation of the lowest floor, including basement. 1.2 For fully enclosed areas below the design flood elevation where provisions to allow for the automatic entry and exit of floodwaters do not meet the minimum requirements in Section 2.6.1.1, ASCE 24, certification by a registered design professional that the design will provide for equalization of hydrostatic flood forces in accordance with Section 2.6.1.2, ASCE 24. 1.3 For dry floodproofed nonresidential buildings, certification by a registered design professional that the dry flood proofing is constructed in accordance with the design.
<b>14</b>  (6) Notify, in riverine situations, adjacent communities and the State Coordinating Office prior to any alteration or relocation of a watercourse, and submit copies of such notifications to the Administrator;	<b>Appendix G103.6 Watercourse alteration.</b> Prior to issuing a permit for any alteration or relocation of any watercourse, the building official shall require the applicant to provide notification of the proposal to the appropriate authorities of all affected adjacent government jurisdictions, as well as appropriate state agencies. A copy of the notification shall be maintained in the permit records and submitted to FEMA.
<b>15</b>  (7) Assure that the flood carrying capacity within the altered or relocated portion of any watercourse is maintained;	<b>Appendix G103.6.1 Engineering analysis.</b> The building official shall require submission of an engineering analysis which demonstrates that the flood carrying capacity of the altered or relocated portion of the watercourse will not be decreased. Such watercourses shall be maintained in a manner which preserves the channel's flood carrying capacity.

## Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IBC®.

NFIP Regulations	IBC® 2000 and Appendix G
<b>16</b>	<p>(8) Require that all manufactured homes to be placed within Zone A on a community's FIRM or FIRM shall be installed using methods and practices which minimize flood damage. For the purposes of this requirement, manufactured homes must be elevated and anchored to resist flotation, collapse, or lateral movement. Methods of anchoring may include, but are not to be limited to, use of over-the-top or frame ties to ground anchors. This requirement is in addition to applicable State and local anchoring requirements for resisting wind forces.</p> <p>(c) When the Administrator has provided a notice of final flood elevations for one or more special flood hazard areas on the community's FIRM and, if appropriate, has designated other special flood hazard areas without base flood elevations on the community's FIRM, but has not identified a regulatory floodway or coastal high hazard area, the community shall:</p> <ul style="list-style-type: none"> <li>(1) Require the standards of paragraph (b) of this section within all A1-30 zones, AE zones, A zones, AH zones, and AO zones, on the community's FIRM;</li> </ul>
<b>17</b>	<ul style="list-style-type: none"> <li>(2) Require that all new construction and substantial improvements of residential structures within Zones A1-30, AE and AH zones on the community's FIRM have the lowest floor (including basement) elevated to or above the base flood level, unless the community is granted an exception by the Administrator for the allowance of basements in accordance with Sec. 60.6 (b) or (c);</li> </ul> <p>[Prior provisions cumulative]</p>
<b>18</b>	<ul style="list-style-type: none"> <li>(3) Require that all new construction and substantial improvements of non-residential structures within Zones A1-30, AE and AH zones on the community's FIRM:</li> </ul> <ul style="list-style-type: none"> <li>(i) have the lowest floor (including basement) elevated to or above the base flood level or, together with attendant utility and sanitary facilities, be designed so that below the base flood level the structure is watertight with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy;</li> </ul> <p><b>1603.1.6 Flood load. SEE BLOCK 6</b></p> <p><b>1612.4 Design and construction. SEE BLOCK 6</b></p> <p><b>1806.1.2.1 Flood hazard areas.</b> For buildings and structures in flood hazard areas as established in Section 1612.3, the finished ground level of an underfloor space such as a crawl space shall be equal to or higher than the outside finished ground level.</p> <p><b>3402.1 Existing buildings or structures. Exception. SEE BLOCK 4</b></p>
<b>19</b>	<p><b>1612.4 Design and construction. SEE BLOCK 6</b></p> <p><b>3402.1 Existing buildings or structures. Exception. SEE BLOCK 4</b></p>

## Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IBC®.

NFIP Regulations	IBC® 2000 and Appendix G
<p><b>20</b> (4) Provide that where a non-residential structure is intended to be made watertight below the base flood level,</p> <p>(i) a registered professional engineer or architect shall develop and/or review structural design, specifications, and plans for the construction, and shall certify that the design and methods of construction are in accordance with accepted standards of practice for meeting the applicable provisions of paragraph (c)(3)(ii) or (c)(8)(iii) of this section, and</p> <p>(ii) a record of such certificates which includes the specific elevation (in relation to mean sea level) to which such structures are floodproofed shall be maintained with the official designated by the community under Sec. 59.22(a)(9)(iii);</p>	<p><b>104.7 Department records.</b></p> <p><b>1612.5.1 Flood hazard certificates.</b> [Flood hazard areas not subject to high velocity wave action] SEE BLOCK 13</p> <p><b>Appendix G103.8 Records.</b> SEE BLOCK 1</p>
<p><b>21</b> (5) Require, for all new construction and substantial improvements, that fully enclosed areas below the lowest floor that are usable solely for parking of vehicles, building access or storage in an area other than a basement and which are subject to flooding shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement must either be certified by a registered professional engineer or architect or meet or exceed the following minimum criteria. A minimum of two openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding shall be provided. The bottom of all openings shall be no higher than one foot above grade. Openings may be equipped with screens, louvers, valves, or other coverings or devices provided that they permit the automatic entry and exit of floodwaters.</p>	<p><b>1202.3.2 Under-floor ventilation. Exception:</b></p> <p>1. For buildings in flood hazard areas as established in Section 1612.3, the opening requirements of ASCE 24 are authorized to be satisfied by ventilation openings that are designed and installed in accordance with ASCE 24.</p> <p><b>1612.4 Design and construction.</b> SEE BLOCK 6</p> <p><b>1612.5.1 Flood hazard certificates.</b> [Flood hazard areas not subject to high velocity wave action] SEE BLOCK 13</p>

## Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IBC®.

NFIP Regulations	IBC® 2000 and Appendix G
<b>22</b>	<p>(6) Require that manufactured homes that are placed or substantially improved within Zones A1-30, AH, and AE on the community's FIRM on sites (i) Outside of a manufactured home park or subdivision; (ii) In a new manufactured home park or subdivision; (iii) In an expansion to an existing manufactured home park or subdivision, or (iv) In an existing manufactured home park or subdivision on which a manufactured home has incurred "substantial damage" as the result of a flood, be elevated on a permanent foundation such that the lowest floor of the manufactured home is elevated to or above the base flood elevation and be securely anchored to an adequately anchored foundation system to resist floatation collapse and lateral movement.</p>
<b>23</b>	<p>(7) Require within any AO zone on the community's FIRM that all new construction and substantial improvements of residential structures have the lowest floor (including basement) elevated above the highest adjacent grade at least as high as the depth number specified in feet on the community's FIRM (at least two feet if no depth number is specified);</p>
<b>24</b>	<p>(8) Require within any AO zone on the community's FIRM that all new construction and substantial improvements of nonresidential structures (i) have the lowest floor (including basement) elevated above the highest adjacent grade at least as high as the depth number specified in feet on the community's FIRM (at least two feet if no depth number is specified), or (ii) together with attendant utility and sanitary facilities be completely floodproofed to that level to meet the floodproofing standard specified in Sec. 603(c)(3)(ii);</p>
<b>25</b>	<p>(9) Require within any A99 zones on a community's FIRM the standards of paragraphs (a)(1) through (a)(4)(i) and (b)(5) through (b)(9) of this section;</p>

## Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IBC®.

NFIP Regulations	IBC® 2000 and Appendix G
<b>26</b>  (10) Require until a regulatory floodway is designated, that no new construction, substantial improvements, or other development (including fill) shall be permitted within Zones A1-30 and AE on the community's FIRM, unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point within the community.	<b>Appendix G103.4 Activities in riverine flood hazard areas.</b> In riverine situations, until a regulatory floodway is designated, the building official shall not permit any new construction, substantial improvement or other development, including fill, unless the applicant demonstrates that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the design flood elevation more than one foot at any point within the community.
<b>27</b>  (11) Require within Zones AH and AO, adequate drainage paths around structures on slopes, to guide floodwaters around and away from proposed structures.	<b>Appendix G401.5 Storm drainage.</b> SEE BLOCK 6
<b>28</b>  (12) Require that manufactured homes to be placed or substantially improved on sites in an existing manufactured home park or subdivision within Zones A-1-30, AH, and AE on the community's FIRM that are not subject to the provisions of paragraph (c)(6) of this section be elevated so that either (i) The lowest floor of the manufactured home is at or above the base flood elevation, or (ii) The manufactured home chassis is supported by reinforced piers or other foundation elements of at least equivalent strength that are no less than 36 inches in height above grade and be securely anchored to an adequately anchored foundation system to resist floatation, collapse, and lateral movement.	<b>Appendix G Section 501 Manufactured Homes.</b> SEE BLOCK 16
<b>29</b>  (13) Notwithstanding any other provisions of Sec. 60.3, a community may approve certain development in Zones A1-30, AE, and AH, on the community's FIRM which increase the water surface elevation of the base flood by more than one foot, provided that the community first applies for a conditional FIRM revision, fulfills the requirements for such a revision as established under the provisions of Sec. 65.12, and receives the approval of the Administrator.	<b>Appendix G103.5 Floodway encroachment.</b> Prior to issuing a permit for any floodway encroachment, including fill, new construction, substantial improvements and other development or land disturbing activity, the building official shall require submission of a certification, along with supporting technical data, that demonstrates that such development will not cause any increase of the level of the base flood. <b>Appendix G103.5.1 Floodway revision.</b> A floodway encroachment that increases the level of the base flood is authorized if the applicant has applied for a conditional FIRM revision and has received the approval of FEMA.

## Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IBC®.

NFIP Regulations	IBC® 2000 and Appendix G
<b>30</b> (14) Require that recreational vehicles placed on sites within Zones A1-30, AH, and AE on the community's FIRM either(i) Be on the site for fewer than 180 consecutive days, (ii) Be fully licensed and ready for highway use, or (iii) Meet the permit requirements of paragraph (b)(1) of this section and the elevation and anchoring requirements for "manufactured homes" in paragraph (c)(6) of this section. A recreational vehicle is ready for highway use if it is on its wheels or jacking system, is attached to the site only by quick disconnect type utilities and security devices, and has no permanently attached additions.	<b>Appendix G601.1 Placement prohibited (Recreational Vehicles)</b> . The placement of recreational vehicles shall not be authorized in flood hazard areas subject to high velocity wave action and in floodways. <b>Appendix G601.2 Temporary placement</b> . Recreational vehicles in flood hazard areas shall be fully licensed and ready for highway use, and shall be placed on a site for less than 180 consecutive days. <b>Appendix G601.3 Permanent placement</b> . Recreational vehicles that are not fully licensed and ready for highway use, or that are to be placed on a site for more than 180 consecutive days shall meet the requirements of Section G501 for manufactured homes.
	(d) When the Administrator has provided a notice of final base flood elevations within Zones A1-30 and/or AE on the community's FIRM and, if appropriate, has designated AO zones, AH zones, A99 zones, and A zones on the community's FIRM, and has provided data from which the community shall designate its regulatory floodway, the community shall:
<b>31</b> (1) Meet the requirements of paragraphs (c) (1) through (14) of this section;	[Prior provisions cumulative]
<b>32</b> (2) Select and adopt a regulatory floodway based on the principle that the area chosen for the regulatory floodway must be designed to carry the waters of the base flood, without increasing the water surface elevation of that flood more than one foot at any point;	<b>1612.3 Establishment of flood hazard areas.</b> SEE BLOCK 3  <b>Appendix G103.4 Activities in riverine flood hazard areas.</b> SEE BLOCK 26
<b>33</b> (3) Prohibit encroachments, including fill, new construction, substantial improvements, and other development within the adopted regulatory floodway unless it has been demonstrated through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that the proposed encroachment would not result in any increase in flood levels within the community during the occurrence of the base flood discharge;	<b>Appendix G103.5 Floodway encroachment.</b> SEE BLOCK 29 <b>Appendix G103.5.1 Floodway revision.</b> SEE BLOCK 29 <b>Appendix G401.1 Development in floodways.</b> Development or land disturbing activity shall not be authorized in the floodway unless it has been demonstrated through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that the proposed encroachment will not result in any increase in the level of the base flood.
<b>34</b> (4) Notwithstanding any other provisions of Sec. 60.3, a community may permit encroachments within the adopted regulatory floodway that would result in an increase in base flood elevations, provided that the community first applies for a conditional FIRM and floodway revision, fulfills the requirements for such revisions as established under the provisions of Sec. 65.12, and receives the approval of the Administrator.	<b>Appendix G103.5.1 Floodway revision.</b> SEE BLOCK 29

## Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IBC®.

NFIP Regulations	IBC® 2000 and Appendix G
(e) When the Administrator has provided a notice of final base flood elevations within Zones A1-30 and/or AE on the community's FIRM and, if appropriate, has designated AH zones, AO zones, A99 zones, and A zones on the community's FIRM, and has identified on the community's FIRM coastal high hazard areas by designating Zones V1-30, VE, and/or V, the community shall.	
<b>35</b> (1) Meet the requirements of paragraphs (c)(1)	[Prior provisions cumulative]
<b>36</b> (2) Within Zones V1-30, VE, and V on a community's FIRM, (i) obtain the elevation (in relation to mean sea level) of the bottom of the lowest structural member of the lowest floor (excluding pilings and columns) of all new and substantially improved structures, and whether or not such structures contain a basement, and (ii) maintain a record of all such information with the official designated by the community under Sec. 59.22(a)(9)(iii);	<p><b>104.7 Department records</b>  <b>1603.1.6 Flood load.</b> SEE BLOCK 6</p> <p><b>1612.1 General (Flood Loads).</b> SEE BLOCK 4</p> <p><b>1612.5 Flood hazard certificates.</b> The following certifications shall be submitted to the building official.</p> <ol style="list-style-type: none"> <li>2. For construction in flood hazard areas subject to high velocity wave action:               <ol style="list-style-type: none"> <li>2.1 As part of the lowest floor elevation inspection required in Section 109.3.3, a certification of the elevation of the lowest horizontal structural member.</li> <li>2.2 A certificate prepared by a registered design professional that the building is designed in accordance with ASCE 24, including that the pile or column foundation and building or structure to be attached thereto is designed to be anchored to resist flotation, collapse and lateral movement due to the effects of wind and flood loads acting simultaneously on all building components, and other load requirements of Chapter 16.</li> <li>2.3 For breakaway walls designed to resist a nominal load of less than 10 psf (0.48 kN/m<sup>2</sup>) or more than 20 psf (0.96 kN/m<sup>2</sup>), a certificate prepared by a registered design professional that the breakaway wall is designed in accordance with ASCE 24.</li> </ol> </li> </ol>
	<p><b>Appendix G103.8 Records.</b> SEE BLOCK 1</p> <p><b>Appendix G. Section 501 Manufactured Homes.</b> SEE BLOCK 16</p>
<b>37</b> (3) Provide that all new construction within Zones V1-30, VE, and V on the community's FIRM is located landward of the reach of mean high tide;	<p><b>Appendix G401.2 Flood hazard areas subject to high velocity wave action.</b></p> <ol style="list-style-type: none"> <li>1. Development or land disturbing activity shall only be authorized landward of the reach of mean high tide.</li> <li>2. The use of fill for structural support of buildings is prohibited.</li> </ol>
<b>38</b> <b>continued on next page</b> (4) Provide that all new construction and substantial improvements in Zones V1-30 and VE, and also Zone V if base flood elevation data is available, on the community's FIRM, are elevated on pilings and columns so that <ol style="list-style-type: none"> <li>(i) the bottom of the lowest horizontal structural member of the lowest floor (excluding the pilings or columns) is elevated to or above the base flood level; and</li> </ol>	<p><b>109.3.3 Lowest floor elevation.</b> SEE BLOCK 13</p> <p><b>1603.1.6 Flood load.</b> SEE BLOCK 6</p> <p><b>1605.2.2 Other loads.</b> SEE BLOCK 6</p> <p><b>1605.3.1.2 Other loads.</b> SEE BLOCK 6</p> <p><b>1612.4 Design and construction.</b> SEE BLOCK 6</p> <p><b>1612.5.2 Flood hazard certificates.</b> [Flood hazard areas subject to high velocity wave action] SEE BLOCK 36</p>

## Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IBC®.

NFIP Regulations	IBC® 2000 and Appendix G
<p><b>38</b> <b>continued from previous page</b></p> <p>(ii) the pile or column foundation and structure attached thereto is anchored to resist flotation, collapse and lateral movement due to the effects of wind and water loads acting simultaneously on all building components. Water loading values used shall be those associated with the base flood. Wind loading values used shall be those required by applicable State or local building standards. A registered professional engineer or architect shall develop or review the structural design, specifications and plans for the construction, and shall certify that the design and methods of construction to be used are in accordance with accepted standards of practice for meeting the provisions of paragraphs (e)(4)(i) and (ii) of this section.</p>	<p><b>1612.4 Design and construction.</b> The design and construction of buildings and structures located in flood hazard areas, including flood hazard areas subject to high velocity wave action, shall be designed and constructed in accordance with ASCE 24.</p> <p><b>1612.5.2 Flood hazard certificates.</b> [Flood hazard areas subject to high velocity wave action] SEE BLOCK 36</p> <p><b>39</b> <b>continued on next page</b></p> <p>(5) Provide that all new construction and substantial improvements within Zones V1-30, VE, and V on the community's FIRM have the space below the lowest floor either free of obstruction or constructed with non-supporting breakaway walls, open wood lattice-work, or insect screening intended to collapse under wind and water loads without causing collapse, displacement, or other structural damage to the elevated portion of the building or supporting foundation system. For the purposes of this section, a breakaway wall shall have a design safe loading resistance of not less than 10 and no more than 20 pounds per square foot. Use of breakaway walls which exceed a design safe loading resistance of 20 pounds per square foot (either by design or when so required by local or State codes) may be permitted only if a registered professional engineer or architect certifies that the designs proposed meet the following conditions:</p> <p>(i) Breakaway wall collapse shall result from a water load less than that which would occur during the base flood; and,</p>

**Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IBC®.**

<b>NFIP Regulations</b>		<b>IBC® 2000 and Appendix G</b>
<b>39</b> <small>continued from previous page</small>	<p>(ii) The elevated portion of the building and supporting foundation system shall not be subject to collapse, displacement, or other structural damage due to the effects of wind and water loads acting simultaneously on all building components (structural and non-structural). Water loading values used shall be those associated with the base flood. Wind loading values used shall be those required by applicable State or local building standards. Such enclosed space shall be useable solely for parking of vehicles, building access, or storage.</p>	<p><b>Appendix G401.2 Flood hazard areas subject to high velocity wave action.</b> SEE BLOCK 37</p>
<b>40</b>	<p>(6) Prohibit the use of fill for structural support of buildings within Zones V1-30, VE, and V on the community's FIRM;</p>	
<b>41</b>	<p>(7) Prohibit man-made alteration of sand dunes and mangrove stands within Zones V1-30, VE, and V on the community's FIRM which would increase potential flood damage.</p>	<p><b>Appendix G103.7 Alterations in coastal areas.</b> Prior to issuing a permit for any alteration of sand dunes and mangrove stands in flood hazard areas subject to high velocity wave action, the building official shall require submission of an engineering analysis which demonstrates that the proposed alteration will not increase the potential for flood damage.</p>
<b>42</b>	<p>(8) Require that manufactured homes placed or substantially improved within Zones V1-30, V, and VE on the community's FIRM on sites (i) Outside of a manufactured home park or subdivision, (ii) In a new manufactured home park or subdivision, (iii) In an expansion to an existing manufactured home park or subdivision, or (iv) In an existing manufactured home park or subdivision on which a manufactured home has incurred "substantial damage" as the result of a flood, meet the standards of paragraphs (e)(2) through (7) of this section and that manufactured homes placed or substantially improved on other sites in an existing manufactured home park or subdivision within Zones VI-30, V, and VE on the community's FIRM meet the requirements of paragraph (c)(12) of this section.</p>	<p><b>Appendix G. Section 501. Manufactured Homes.</b> SEE BLOCK 16</p>

## Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IBC®.

NFIP Regulations		Appendix G. Section 601. Recreational Vehicles. SEE BLOCK 30	IBC® 2000 and Appendix G
<b>43</b>	(9) Require that recreational vehicles placed on sites within Zones V1-30, V, and VE on the community's FIRM either (i) Be on the site for fewer than 180 consecutive days, (ii) Be fully licensed and ready for highway use, or (iii) Meet the requirements in paragraphs (b)(1) and (e) (2) through (7) of this section. A recreational vehicle is ready for highway use if it is on its wheels or jacking system, is attached to the site only by quick disconnect type utilities and security devices, and has no permanently attached additions.		
<b>44</b>	<b>Sec. 60.6 Variance and exceptions</b>  (a) The Administrator does not set forth absolute criteria for granting variances from the criteria set forth in Secs. 60.3, 60.4, and 60.5. The issuance of a variance is for flood plain management purposes only. Insurance premium rates are determined by statute according to actuarial risk and will not be modified by the granting of a variance. The community, after examining the applicant's hardships, shall approve or disapprove a request. While the granting of variances generally is limited to a lot size less than one-half acre (as set forth in paragraph (a) (2) of this section), deviations from that limitation may occur. However, as the lot size increases beyond one-half acre, the technical justification required for issuing a variance increases. The Administrator may review a community's findings justifying the granting of variances, and if that review indicates a pattern inconsistent with the objectives of sound flood plain management, the Administrator may take appropriate action under Sec. 59.24(b) of this subchapter.	<p><b>Appendix G105.1 General (Variances).</b> The board of appeals established pursuant to Section 112 shall hear and decide requests for variances. The board of appeals shall base its determination on technical justifications, and has the right to attach such conditions to variances as it deems necessary to further the purposes and objectives of this appendix and Section 1612.</p> <p><b>Appendix G105.6 Considerations.</b> In reviewing applications for variances, the board of appeals shall consider all technical evaluations, all relevant factors, all other portions of this appendix, and the following:</p> <ol style="list-style-type: none"> <li>1. The danger that materials and debris may be swept onto other lands resulting in further injury or damage;</li> <li>2. The danger to life and property due to flooding or erosion damage;</li> <li>3. The susceptibility of the proposed development, including contents, to flood damage and the effect of such damage on current and future owners;</li> <li>4. The importance of the services provided by the proposed development to the community;</li> <li>5. The availability of alternate locations for the proposed development that are not subject to flooding or erosion;</li> <li>6. The compatibility of the proposed development with existing and anticipated development;</li> <li>7. The relationship of the proposed development to the comprehensive plan and floodplain management program for that area;</li> <li>8. The safety of access to the property in times of flood for ordinary and emergency vehicles;</li> <li>9. The expected heights, velocity, duration, rate of rise, and debris and sediment transport of the flood waters and the effects of wave action, if applicable, expected at the site, and;</li> <li>10. The costs of providing governmental services during and after flood conditions including maintenance and repair of public utilities and facilities such as sewer, gas, electrical, and water systems, streets and bridges.</li> </ol>	

## Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IBC®.

NFIP Regulations	IBC® 2000 and Appendix G
<p><b>45</b> Variances may be issued for the repair or rehabilitation of historic structures upon a determination that the proposed repair or rehabilitation will not preclude the structure's continued designation as a historic structure and the variance is the minimum necessary to preserve the historic character and design of the structure.</p>	<p><b>Appendix G105.3 Historic structures.</b> A variance is authorized to be issued for the repair or rehabilitation of a historic structure upon a determination that the proposed repair or rehabilitation will not preclude the structure's continued designation as a historic structure, and the variance is the minimum necessary to preserve the historic character and design of the structure.</p> <p><b>Appendix G105.5 Restrictions.</b> The board of appeals shall not issue a variance for any proposed development in a floodway if any increase in flood levels would result during the base flood discharge.</p>
<p><b>46</b> Procedures for the granting of variances by a community are as follows. (1) Variances shall not be issued by a community within any designated regulatory floodway if any increase in flood levels during the base flood discharge would result;</p>	<p><b>Appendix G105.1 General (Variances).</b> SEE BLOCK 44</p> <p><b>Appendix G105.6 Considerations.</b> SEE BLOCK 44</p>
<p><b>47</b> (2) Variances may be issued by a community for new construction and substantial improvements to be erected on a lot of one-half acre or less in size contiguous to and surrounded by lots with existing structures constructed below the base flood level, in conformance with the procedures of paragraphs (a) (3), (4), (5) and (6) of this section;</p>	<p><b>Appendix G105.7 Conditions for issuance.</b> Variances shall only be issued by the board of appeals upon:</p> <ol style="list-style-type: none"> <li>1. A technical showing of good and sufficient cause that the unique characteristics of the size, configuration, or topography of the site renders the elevation standards inappropriate; and</li> <li>2. A determination that failure to grant the variance would result in exceptional hardship by rendering the lot undevelopable; and</li> <li>3. A determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, extraordinary public expense, nor create nuisances, cause fraud on or victimization of the public, or conflict with existing local laws or ordinances; and</li> <li>4. A determination that the variance is the minimum necessary, considering the flood hazard, to afford relief; and</li> <li>5. Notification to the applicant in writing over the signature of the building official that the issuance of a variance to construct a structure below the base flood level will result in increased premium rates for flood insurance up to amounts as high as \$25 for \$100 of insurance coverage, and that such construction below the base flood level increases risks to life and property.</li> </ol>
<p><b>48</b> (6) Variances shall only be issued by a community upon</p> <ul style="list-style-type: none"> <li>(i) a showing of good and sufficient cause,</li> <li>(ii) a determination that failure to grant the variance would result in exceptional hardship to the applicant, and</li> <li>(iii) a determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, extraordinary public expense, create nuisances, cause fraud on or victimization of the public, or conflict with existing local laws or ordinances;</li> </ul>	<p><b>Appendix G105.7 Conditions for issuance.</b> SEE BLOCK 48</p>
	<p><b>49</b> (4) Variances shall only be issued upon a determination that the variance is the minimum necessary, considering the flood hazard, to afford relief;</p>

## Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IBC®.

NFIP Regulations	IBC® 2000 and Appendix G
<p><b>50</b> (5) A community shall notify the applicant in writing over the signature of a community official that</p> <ul style="list-style-type: none"> <li>(i) the issuance of a variance to construct a structure below the base flood level will result in increased premium rates for flood insurance up to amounts as high as \$25 for \$100 of insurance coverage and</li> <li>(ii) such construction below the base flood level increases risks to life and property. Such notification shall be maintained with a record of all variance actions as required in paragraph (a)(6) of this section; and</li> </ul>	<p><b>Appendix G105.7 Conditions for issuance.</b> SEE BLOCK 48</p>
<p><b>51</b> (6) A community shall (i) maintain a record of all variance actions, including justification for their issuance, and (ii) report such variances issued in its annual or biennial report submitted to the Administrator.</p>	<p><b>Appendix G105.2 Records.</b> The building official shall maintain a permanent record of all variance actions, including justification for their issuance.</p>
<p><b>52</b> (7) Variances may be issued by a community for new construction and substantial improvements and for other development necessary for the conduct of a functionally dependent use provided that</p> <ul style="list-style-type: none"> <li>(i) the criteria of paragraphs (a)(1) through (a)(4) of this section are met, and</li> <li>(ii) the structure or other development is protected by methods that minimize flood damages during the base flood and create no additional threats to public safety.</li> </ul>	<p><b>Appendix G105.4 Functionally dependent facilities.</b> A variance is authorized to be issued for the construction or substantial improvement of a functionally dependent facility provided the criteria in Section 1612.1 are met and the variance is the minimum necessary to allow the construction or substantial improvement, and that all due consideration has been given to methods and materials that minimize flood damages during the design flood and create no additional threats to public safety.</p>



# **Appendix C. Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IRC<sup>TM</sup>**

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## Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IRC<sup>TM</sup>.

NFIP Regulations	IRC <sup>TM</sup> 2000
<b>Sec. 59.1 Definitions</b>	
<b>BASE FLOOD.</b> Base flood means the flood having a one percent chance of being equaled or exceeded in any given year.	R301.2.4 Floodplain construction. SEE BLOCK 3 Table R301.2(1) Climatic and Geographic Design Criteria. Flood Hazards. SEE BLOCK 3
<b>BASEMENT.</b> Any area of the building having its floor subgrade (below ground level) on all sides.	R327.1.3 Establishing the design flood elevation. SEE BLOCK 12
<b>DEVELOPMENT.</b> Any man-made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations or storage of equipment or materials.	R327.1.4 Lowest floor. SEE BLOCK 28 R327.2.1 [Flood hazard areas (including A Zones)] Elevation requirements. SEE BLOCK 18 R327.3.1 [Coastal flood hazard areas (including V Zones)] Elevation requirements. SEE BLOCK 18 R408.5 [Under-Floor Space] Finished grade. SEE BLOCK 18
<b>EXISTING CONSTRUCTION (EXISTING STRUCTURES).</b> For the purposes of determining rates, structures for which the "start of construction" commenced before the effective date of the FIRM or before January 1, 1975, for FIRMs effective before that date. "Existing construction" may also be referred to as "existing structures."	R101.2 Scope. R105.1 Permits required. R105.2 Work exempt from permit. R105.3.1.1 Substantially improved or substantially damaged existing buildings and structures. SEE BLOCK 4 <b>BUILDING, EXISTING</b> in Chapter 2.
<b>FLOOD OR FLOODING.</b>	[General usage throughout.]
(a) A general and temporary condition of partial or complete inundation of normally dry land areas from. (1) The overflow of inland or tidal waters. (2) The unusual and rapid accumulation or runoff of surface waters from any source.	R301.2.4 Floodplain construction. Exception. SEE BLOCK 3 Table R301.2(1) Climatic and Geographic Design Criteria. Flood Hazards. SEE BLOCK 3
<b>FLOOD INSURANCE RATE MAP (FIRM).</b> An official map of a community, on which the Administrator has delineated both the special hazard areas and the risk premium zones applicable to the community.	R301.2.4 Floodplain construction. Exception. SEE BLOCK 3 Table R301.2(1) Climatic and Geographic Design Criteria. Flood Hazards. SEE BLOCK 3
<b>FLOODWAY – See REGULATORY FLOODWAY.</b>	R327.2.1 [Flood hazard areas (including A Zones)] Elevation requirements. SEE BLOCK 18
<b>HIGHEST ADJACENT GRADE.</b> The highest natural elevation of the ground surface prior to construction next to the proposed walls of a structure.	

## Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IRC™.

NFIP Regulations	IRC™ 2000
<b>HISTORIC STRUCTURE.</b>	[Not explicitly defined; refer to definition in IBC®.]
(a) Listed individually in the National Register of Historic Places (a listing maintained by the Department of Interior) or preliminarily determined by the Secretary of the Interior as meeting the requirements for individual listing on the National Register;	
(b) Certified or preliminarily determined by the Secretary of the Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined by the Secretary to qualify as a registered historic district;	
(c) Individually listed on a state inventory of historic places in states with historic preservation programs which have been approved by the Secretary of the Interior; or	
(d) Individually listed on a local inventory of historic places in communities with historic preservation programs that have been certified either:	
(1) By an approved state program as determined by the Secretary of the Interior or	
(2) Directly by the Secretary of the Interior in states without approved programs.	
<b>LOWEST FLOOR.</b> The lowest floor of the lowest enclosed area (including basement). An unfinished or flood resistant enclosure, usable solely for parking of vehicles, building access or storage in an area other than a basement area is not considered a building's lowest floor; provided, that such enclosure is not built so as to render the structure in violation of the applicable non-elevation design requirements of Sec. 603.	R309.5 [Garages and Carports] Flood hazard areas. SEE BLOCK 21 R327.1.4 Lowest floor. SEE BLOCK 18
<b>MANUFACTURED HOME.</b> A structure, transportable in one or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when attached to the required utilities. The term "manufactured home" does not include a "recreational vehicle."	Chapter 2, MANUFACTURED HOME. Appendix E Manufactured Housing Used as Dwellings.
<b>MANUFACTURED HOME PARK OR SUBDIVISION.</b> A parcel (or contiguous parcels) of land divided into two or more manufactured home lots for rent or sale.	[Subdivision of land not addressed in IRC™; see IBC® Appendix G.]

## Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IRC™.

NFIP Regulations	IRC™ 2000
<b>RECREATIONAL VEHICLE.</b> A vehicle which is:	R107 Temporary structures and uses.
(a) built on a single chassis;	
(b) 400 square feet or less when measured at the largest horizontal projection;	
(c) designed to be self-propelled or permanently towable by a light duty truck; and	
(d) designed primarily not for use as a permanent dwelling but as temporary living quarters for recreational, camping, travel, or seasonal use.	
<b>REGULATORY FLOODWAY.</b> The channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.	See FLOODWAY.
<b>REMEDY A VIOLATION.</b> to bring the structure or other development into compliance with State or local flood plain management regulations, or, if this is not possible, to reduce the impacts of its noncompliance. Ways that impacts may be reduced include protecting the structure or other affected development from flood damages, implementing the enforcement provisions of the ordinance or otherwise deterring future similar violations, or reducing Federal financial exposure with regard to the structure or other development.	R113 Violations.
<b>STRUCTURE.</b> For flood plain management purposes, a walled and roofed building, including a gas or liquid storage tank, that is principally above ground, as well as a manufactured home. "Structure" for insurance coverage purposes, means a walled and roofed building, other than a gas or liquid storage tank, that is principally above ground and affixed to a permanent site, as well as a manufactured home on a permanent foundation. For the latter purpose, the term includes a building while in the course of construction, alteration or repair, but does not include building materials or supplies intended for use in such construction, alteration or repair, unless such materials or supplies are within an enclosed building on the premises.	R102.1 Scope. R105.2 Work exempt from permit. <b>Appendix E Manufactured Housing Used as Dwellings.</b>
<b>SUBSTANTIAL DAMAGE.</b> Damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.	<b>R105.3.1.1 Substantially improved or substantially damaged existing buildings and structures.</b> SEE BLOCK 4

## Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IRC<sup>TM</sup>.

NFIP Regulations	IRC <sup>TM</sup> 2000
<b>SUBSTANTIAL IMPROVEMENT.</b> Any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure before the "start of construction" of the improvement. This term includes structures which have incurred "substantial damage", regardless of the actual repair work performed. The term does not, however, include either. <ul style="list-style-type: none"> <li>(1) Any project for improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions or</li> <li>(2) Any alteration of a "historic structure", provided that the alteration will not preclude the structure's continued designation as a "historic structure."</li> </ul>	R102.7.1 [Existing structures] Additions, alterations or repairs. R105.3.1.1 Substantially improved or substantially damaged existing buildings and structures. SEE BLOCK 4 R108.3 Building permit valuations.
<b>VARIANCE.</b> A grant of relief by a community from the terms of a flood plain management regulation.	R104.10.1 [Modifications] Areas prone to flooding. BLOCK 44 R112.2.2 Criteria for issuance of a variance for flood hazard areas. SEE BLOCK 47
<b>VIOLATION.</b> The failure of a structure or other development to be fully compliant with the community's flood plain management regulations. A structure or other development without the elevation certificate, other certifications, or other evidence of compliance required in Sec. 60.3(b)(5), (c)(4), (c)(10), (d)(3), (e)(2), (e)(4), or (e)(5) is presumed to be in violation until such time as that documentation is provided.	R113 Violations.
<b>Sec. 59.22</b> [This section outlines actions to be taken by communities to be eligible for the Program, including application procedures, documentation requirements, and a commitment to fulfill certain functions and responsibilities.]	Sec. 59.22 [This section outlines actions to be taken by communities to be eligible for the Program, including application procedures, documentation requirements, and a commitment to fulfill certain functions and responsibilities.]
<b>1</b>	(a)(9)(iii) Maintain for public inspection and furnish upon request certificates of elevation and certificates of floodproofing.
<b>2</b>	(b)(1) Appoint the agency or official with the responsibility, authority, and means to implement the commitments, including certain reporting requirements.
	R104.7 Department records.
	R103 Department of Building Safety.
	R104 Duties and Powers of Code Official.

## Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IRC™.

	NFIP Regulations	IRC™ 2000
<b>3</b>	<p><b>Sec. 60.2 Minimum compliance with flood plain management criteria.</b>  [Sections (a) through (c) pertain to meeting specific criteria set forth herein, as a function of the type of flood-related hazard and the level of detail provided on the flood hazard map prepared by FEMA. Section (e) provides for coordination with State Coordinating Agencies with respect to submission of regulations for participation in the NFIP; Section (f) addresses the community function to submit reports periodically, when requested; and Section (g) directs communities to assure that their comprehensive plans are consistent with floodplain management objectives.]</p> <p>(h) The community shall adopt and enforce floodplain management regulations based on data provided by the Administrator. Without prior approval of the Administrator, the community shall not adopt and enforce floodplain management regulations based upon modified data reflecting natural or man-made changes.</p>	<p><b>R301.2.4 Floodplain construction.</b> Buildings and structures constructed in flood hazard areas (including A or V Zones) as established in Table R301.2(1) shall be designed and constructed in accordance with Section R327.</p> <p><b>Exception:</b> buildings in floodways that are designated on the Flood Insurance Rate Maps (FIRM) or the Flood Boundary and Floodway Maps (FBFM) that are provided by the National Flood Insurance Program shall not be approved under this section; the provisions of the <i>International Building Code</i> shall apply.</p> <p><b>Table R301.2(1) Climatic and Geographic Design Criteria.</b> The jurisdiction shall fill in this part of the table with (a) the date of the jurisdiction's entry into the National Flood Insurance Program (date of adoption of the first code or ordinance for management of flood hazard areas), (b) the date(s) of the currently effective FIRM and FBFM, or other flood hazard map adopted by the community, as may be amended.</p> <p><b>R327.1 General.</b> All buildings and structures erected in areas prone to flooding as identified in Table R301.2(1) and classified as either flood hazard areas (including A Zones) or coastal high hazard areas (including V-Zones) shall be constructed and elevated as required by the provisions contained in this section.</p> <p><b>Exception:</b> All buildings and structures erected in identified floodways as established in Table R301.2(1) shall be designed and constructed as stipulated in the <i>International Building Code</i>.</p>
<b>4</b>	<p><b>Sec. 60.3 Floodplain management criteria for flood-prone areas.</b></p> <p>(a) When the Administrator has not defined the special flood hazard areas within a community, has not provided water surface elevation data, and has not provided sufficient data to identify the floodway or coastal high hazard area, but the community has indicated the presence of such hazards by submitting an application to participate in the Program, the community shall:</p>	<p><b>R101.2 Scope.</b></p> <p><b>R105.2 Work exempt from permit.</b></p> <p><b>R105.3.1.1 Substantially improved or substantially damaged existing buildings and structures.</b> For applications for reconstruction, rehabilitation, addition, or other improvement of existing buildings or structures located in an area prone to flooding as established by Table R301.2(1), the building official shall examine or cause to be examined the construction documents and shall prepare a finding with regard to the value of the proposed work. For buildings that have sustained damage of any origin, the value of the proposed work shall include the cost to repair the building or structure to its predamage condition. If the building official finds that the value of proposed work equals or exceeds 50 percent of the market value of the building or structure, the finding shall be provided to the board of appeals for a determination of substantial improvement or substantial damage. Applications determined by the board of appeals to constitute substantial improvement or substantial damage shall meet the requirements of R327.</p>

## Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IRC™ .

NFIP Regulations	IRC™ 2000
<b>4</b> continued from previous page	<p><b>R106.1.3 Information for construction in areas prone to flooding.</b> For buildings and structures in flood hazard areas as established by Table R301.2(1), construction documents shall include:</p> <ol style="list-style-type: none"> <li>1. Delineation of flood hazard areas, floodway boundaries, and flood zones, and the design flood elevation, as appropriate;</li> <li>2. The elevation of the proposed lowest floor, including basement, in areas of shallow flooding (AO zones), the height of the proposed lowest floor, including basement, above the highest adjacent finished grade; and</li> <li>3. If design flood elevations are not included on the community's Flood Insurance Rate Map (FIRM), the code official and the applicant shall obtain and reasonably utilize any design flood elevation and floodway data available from other sources.</li> </ol> <p><b>R301.2.4 Floodplain construction.</b> SEE BLOCK 3</p> <p><b>Table R301.2(1) Climatic and Geographic Design Criteria. Flood Hazards.. SEE BLOCK 3</b></p> <p><b>R327.2 Flood hazard areas (including A Zones).</b> All areas that have been determined to be prone to flooding but not subject to high velocity wave action shall be designated as flood hazard areas. All buildings and structures erected in flood hazard areas shall be designed and constructed in accordance with Sections R327.2.1 through R327.2.3.</p>
	<p><b>Appendix E Manufactured Housing, Section AE101 Scope. Exception:</b> In addition to these provisions, new and replacement manufactured homes to be located in flood hazard areas as established by Table R301.2(1) of the <i>International Residential Code</i> shall meet the applicable requirements of Section R327 of the <i>International Residential Code</i>.</p> <p><b>Appendix J Existing Buildings and Structures, Section AJ102.5 Flood hazard areas.</b> Work performed in existing buildings located in a flood hazard area as established by Table 301.2(1) shall be subject to the provisions of R105.3.1.1. [NOTE: See Errata for the 2000 IRC™ ]</p>
<b>5</b>	<p>(2) Review proposed development to assure that all necessary permits have been received from other governmental agencies from which approval is required by Federal or State law, including section 404 of the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. 1334;</p> <p>(3) Review all permit applications to determine whether proposed building sites will be reasonably safe from flooding. If a proposed building site is in a flood-prone area, all new construction and substantial improvements shall</p>
<b>6</b> continued on next page	<p><b>R105.3.1.1 Substantially improved or substantially damaged existing buildings SEE BLOCK 4</b></p> <p><b>R301.1 Design.</b> Buildings and structures, and all parts thereof, shall be constructed to support safely all loads, including dead loads, live loads, roof loads, flood loads, snow loads, wind loads and seismic loads as prescribed in this code.</p> <p><b>R301.2.4 Floodplain construction.</b> SEE BLOCK 3</p> <p><b>R327.1 [Flood Resistant Construction] General. Exception.</b> [Refer to IBC® for floodway construction.] SEE BLOCK 3</p>

## Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IRC™ .

NFIP Regulations	IRC™ 2000
<p><b>6</b> continued from previous page</p> <p>(i) be designed (or modified) and adequately anchored to prevent flotation, collapse, or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy,</p> <p>(ii) be constructed with materials resistant to flood damage,</p> <p>(iii) be constructed by methods and practices that minimize flood damages, and</p> <p>(iv) be constructed with electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities that are designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding.</p> <p>R327.1.1 <b>Structural systems.</b> All structural systems of all buildings and structures shall be designed, connected and anchored to resist flotation, collapse or permanent lateral movement due to structural loads and stresses from flooding equal to the design flood elevation.</p> <p>R327.1.2 <b>Flood-resistant construction.</b> All buildings and structures erected in areas prone to flooding shall be constructed by methods and practices that minimize flood damage.</p> <p>R327.1.5 <b>Protection of mechanical and electrical systems.</b> New and replacement electrical equipment, heating, ventilating, air conditioning, plumbing connections, and other service equipment shall be located at or above the design flood elevation. Electrical wiring and outlets, switches, junction boxes and panels shall be elevated to or above the design flood elevation unless they conform to the provisions of the electrical part of this code for location of such items in wet locations. Duct systems shall not be installed below the design flood elevation.</p> <p>R327.1.7 <b>Flood-resistant materials.</b> Building materials used below the design flood elevation shall comply with the following:</p> <ol style="list-style-type: none"> <li>1. All wood, including floor sheathing, shall be pressure preservatively treated in accordance with AWPA C1, C2, C3, C4, C9, C15, C18, C22, C23, C24, C28, P1, P2 and P3 or decay-resistant heartwood or redwood, black locust, or cedars.</li> <li>2. Materials and installation methods used for flooring and interior and exterior walls shall conform to the provisions of FEMA/FIA-TB-B2.</li> </ol> <p>R327.2.3 <b>Foundation design and construction.</b> Foundation walls for all buildings and structures erected in flood hazard areas shall meet the requirements of Chapter 4.</p> <p><b>Exception:</b> Unless designed in accordance with Section 404.</p> <ol style="list-style-type: none"> <li>1. The unsupported height of 6 inches (152 mm) plain masonry walls shall be no greater than 3 feet (914 mm).</li> <li>2. The unsupported height of 8 inches (203 mm) plain masonry walls shall be no greater than 4 feet (1219 mm).</li> <li>3. The unsupported height of 8 inches (203 mm) reinforced masonry walls shall be no greater than 8 feet (2438 mm).</li> </ol> <p>For the purpose of this exception, unsupported height is the distance from the finished grade to the under-floor space and the top of the wall.</p> <p><b>R401.1 [Foundations] General. Exceptions:</b> (2) In addition to the provisions of this chapter, the design and construction of foundations in areas prone to flooding as established by Table R301.2(1) shall meet the provisions of Section R327.</p> <p><b>G2404.7 (301.11) Flood hazard.</b> For structures located in special flood hazard areas, the appliance, equipment and system installations regulated by this code shall comply with the flood-resistant construction requirements of this code.</p>	

**Appendix E Manufactured Housing, Section AE502.3 Footings and foundations.** Piers and bearing walls shall be supported on masonry or concrete foundations or piles or other approved foundation systems which shall be of sufficient capacity to support all loads.

## Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IRC™ .

NFIP Regulations	IRC™ 2000
<b>7</b> <p>(4) Review subdivision proposals and other proposed new development, including manufactured home parks or subdivisions, to determine whether such proposals will be reasonably safe from flooding. If a subdivision proposal or other proposed new development is in a flood-prone area, any such proposals shall be reviewed to assure that:</p> <ul style="list-style-type: none"> <li>(i) all such proposals are consistent with the need to minimize flood damage within the flood-prone area;</li> <li>(ii) all public utilities and facilities, such as sewer, gas, electrical, and water systems are located and constructed to minimize or eliminate flood damage, and</li> <li>(iii) adequate drainage is provided to reduce exposure to flood hazards;</li> </ul>	<p>[Subdivision of land not addressed in IRC™ ; see IBC® Appendix G.]</p> <p><b>R327.1.6 Protection of water supply and sanitary sewage systems.</b> New and replacement water supply systems shall be designed to minimize infiltration of flood waters into the systems in accordance with the plumbing provisions of this code. New and replacement sanitary sewage systems shall be designed to minimize infiltration of floodwaters into systems and discharges from systems into floodwaters in accordance with the plumbing provisions of this code and Chapter 3 of the <i>International Private Sewage Disposal Code</i>.</p>
<b>8</b> <p>(5) Require within flood-prone areas new and replacement water supply systems to be designed to minimize or eliminate infiltration of flood waters into the systems; and</p>	<p><b>R327.1.6 Protection of water supply and sanitary sewage systems. SEE BLOCK 7</b></p>
<b>9</b> <p>(6) Require within flood-prone areas</p> <ul style="list-style-type: none"> <li>(i) new and replacement sanitary sewage systems to be designed to minimize or eliminate infiltration of flood waters into the systems and discharges from the systems into flood waters and</li> <li>(ii) onsite waste disposal systems to be located to avoid impairment to them or contamination from them during flooding.</li> </ul>	<p><b>R327.1.6 Protection of water supply and sanitary sewage systems. SEE BLOCK 7</b></p>

## Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IRC™ .

NFIP Regulations	IRC™ 2000
(b) When the Administrator has designated areas of special flood hazards (A zones) by the publication of a community's FHBM or FIRM, but has neither produced water surface elevation data nor identified a floodway or coastal high hazard area, the community shall:	
<b>10</b>	<p>(1) Require permits for all proposed construction of manufactured homes, within Zone A on the community's FHBM or FIRM;</p> <p>(2) Require the application of the standards in paragraphs (a) (2), (3), (4), (5) and (6) of this section to development within Zone A on the community's FHBM or FIRM;</p> <p>(3) Require that all new subdivision proposals and other proposed developments (including proposals for manufactured home parks and subdivisions greater than 50 lots or 5 acres, whichever is the lesser, include within such proposals base flood elevation data;</p>
<b>11</b>	<p>(4) Obtain, review and reasonably utilize any base flood elevation and floodway data available from a Federal, State, or other source, including data developed pursuant to paragraph (b)(3) of this section, as criteria for requiring that new construction, substantial improvements, or other development in Zone A on the community's FHBM or FIRM meet the standards in paragraphs (c)(2), (c)(3), (c)(5), (c)(6), (c)(12), (c)(14), (d)(2) and (d)(3) of this section;</p>
<b>12</b>	<p>(5) Where base flood elevation data are utilized, within Zone A on the community's FHBM or FIRM:</p> <p>(i) Obtain the elevation (in relation to mean sea level) of the lowest floor (including basement) of all new and substantially improved structures, and</p> <p>(ii) Obtain, if the structure has been floodproofed in accordance with paragraph (c)(3)(ii) of this section, the elevation (in relation to mean sea level) to which the structure was floodproofed, and (iii) Maintain a record of all such information with the official designated by the community under Sec. 59.22.(a)(9)(iii);</p> <p><b>R106.1.3(3) Information for construction in areas prone to flooding. SEE BLOCK 4</b></p> <p><b>R327.1.3 Establishing the design flood elevation.</b> The design flood elevation shall be used to define areas prone to flooding, and shall describe, at a minimum, the base flood elevation at the depth of peak elevation of flooding (including wave height) which has a 1 percent (100-year flood) or greater chance of being equaled or exceeded in any given year.</p>
<b>13</b>	<p><b>R104.7 Department records</b></p> <p><b>R109.1.3 Floodplain inspections.</b> For construction permitted in areas prone to flooding as established by Table 301.2(1), upon placement of the lowest floor, including basement, and prior to further vertical construction, the building official shall require submission of a certification, prepared by a registered professional engineer or land surveyor, of the elevation of the lowest floor, including basement, required in Section R327.</p> <p><b>R327.1.9 As-built elevation certifications.</b> A licensed land surveyor or registered design professional shall certify that the building or structure is in compliance with the elevation requirements of Section R327.2 or R327.3.</p> <p>[NFIP requirement 60.3(b)(5)(ii) applies to non-residential construction; see IBC®.]</p>

**Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IRC™ .**

NFIP Regulations		IRC™ 2000
<b>14</b>	(6) Notify, in riverine situations, adjacent communities and the State Coordinating Office prior to any alteration or relocation of a watercourse, and submit copies of such notifications to the Administrator;	[Not addressed in IRC™ , see IBC® Appendix G.]
<b>15</b>	(7) Assure that the flood carrying capacity within the altered or relocated portion of any watercourse is maintained;	[Not addressed in IRC™ , see IBC® Appendix G.]
<b>16</b>	(8) Require that all manufactured homes to be placed within Zone A on a community's FHBM or FIRM shall be installed using methods and practices which minimize flood damage. For the purposes of this requirement, manufactured homes must be elevated and anchored to resist flotation, collapse, or lateral movement. Methods of anchoring may include, but are not to be limited to, use of over-the-top or frame ties to ground anchors. This requirement is in addition to applicable State and local anchoring requirements for resisting wind forces.	R327.1.8 <b>Manufactured housing.</b> New or replacement manufactured housing shall be elevated in accordance with Section R327.2 and the anchor and tie-down requirements of Sections AE604 and AE605 of Appendix E shall apply. The foundation and anchorage of manufactured housing to be located in identified flood ways as established in Table R301.2(1) shall be designed and constructed in accordance with the applicable provisions in the <i>International Building Code</i> .
<b>17</b>	(c) When the Administrator has provided a notice of final flood elevations for one or more special flood hazard areas on the community's FIRM and, if appropriate, has designated other special flood hazard areas without base flood elevations on the community's FIRM, but has not identified a regulatory floodway or coastal high hazard area, the community shall:	<b>Appendix E Manufactured Housing, Section AE101 Exception SEE BLOCK 4</b> [Prior provisions cumulative.]
<b>18</b> <b>continued on next page</b>	(1) Require the standards of paragraph (b) of this section within all A1-30 zones, AE zones, A zones, AH zones, and AO zones, on the community's FIRM.  (2) Require that all new construction and substantial improvements of residential structures within Zones A1-30, AE and AH zones on the community's FIRM have the lowest floor (including basement) elevated to or above the base flood level, unless the community is granted an exception by the Administrator for the allowance of basements in accordance with Sec. 60.6 (b) or (c);	R105.3.1.1 <b>Substantially improved or substantially damaged existing buildings.</b> SEE BLOCK 4 R327.2.1 <b>[Flood hazard areas (including A Zones)] Elevation requirements.</b> <ol style="list-style-type: none"> <li>1. Buildings and structures shall have the lowest floors elevated to or above the design flood elevation.</li> <li>2. In areas of shallow flooding (AO Zones), buildings and structures shall have the lowest floor (including basement) elevated at least as high above the highest adjacent grade as the depth number specified in feet (mm) on the FIRM, or at least 2 feet (51 mm) if a depth number is not specified.</li> <li>3. Basement floors that are below grade on all sides shall be elevated to or above the design flood elevation.</li> </ol> <b>Exception:</b> Enclosed areas below the design flood elevation, including basements whose floors are not below grade on all sides, shall meet the requirements of Section R327.2.2.

**Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IRC™ .**

NFIP Regulations	IRC™ 2000
<b>18</b> continued from previous page	<p>R327.1.4 <b>Lowest floor.</b> The lowest floor shall be the floor of the lowest enclosed area, including basement, but excluding any unfinished flood-resistant enclosure that is useable solely for vehicle parking, building access or limited storage provided that such enclosure is not built so as to render the building or structure in violation of this section.</p> <p><b>R408.5 (Under-Floor Space) Finished grade.</b> . . . where there is evidence that the surface water does not readily drain from the building site, the grade in the under-floor space shall be as high as the outside finished grade, unless an approved drainage system is provided.</p> <p><b>Appendix J Existing Buildings and Structures, Section AJ102.5 Flood hazard areas.</b> SEE BLOCK 4</p>
<b>19</b>	<p>(3) Require that all new construction and substantial improvements of non-residential structures within Zones A1-30, AE and AH zones on the community's firm:</p> <ul style="list-style-type: none"> <li>(i) have the lowest floor (including basement) elevated to or above the base flood level or, together with attendant utility and sanitary facilities, be designed so that below the base flood level the structure is watertight with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy;</li> </ul> <p>(4) Provide that where a non-residential structure is intended to be made watertight below the base flood level,</p> <ul style="list-style-type: none"> <li>(i) A registered professional engineer or architect shall develop and/or review structural design, specifications, and plans for the construction, and shall certify that the design and methods of construction are in accordance with accepted standards of practice for meeting the applicable provisions of paragraph (c)(3)(ii) or (c)(8)(ii) of this section, and</li> <li>(ii) A record of such certificates which includes the specific elevation (in relation to mean sea level) to which such structures are floodproofed shall be maintained with the official designated by the community under Sec. 59.22(a)(9)(ii);</li> </ul> <p>[NFIP requirement 60.3(c)(3) applies to non-residential construction, see IBC®.]</p>
<b>20</b>	<p>[NFIP requirement 60.3(c)(4) applies to non-residential construction, see IBC®.]</p>

## Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IRC™ .

	NFIP Regulations	IRC™ 2000
21	<p>(5) Require, for all new construction and substantial improvements, that fully enclosed areas below the lowest floor that are usable solely for parking of vehicles, building access or storage in an area other than a basement and which are subject to flooding shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters.</p> <p>Designs for meeting this requirement must either be certified by a registered professional engineer or architect or meet or exceed the following minimum criteria: A minimum of two openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding shall be provided. The bottom of all openings shall be no higher than one foot above grade. Openings may be equipped with screens, louvers, valves, or other coverings or devices provided that they permit the automatic entry and exit of floodwaters.</p>	<p><b>R105.3.1.1 Substantially improved or substantially damaged existing buildings.</b> SEE BLOCK 4</p> <p><b>R309.5 [Garages] Flood hazard areas.</b> For buildings located in flood hazard areas as established by Table 301.2(1), garage floors shall be:</p> <ol style="list-style-type: none"> <li>Elevated to or above the design flood elevation as determined in Section R327; or</li> <li>Located below the design flood elevated provided they are at or above grade on all sides, are used solely for parking, building access, or storage, meet the requirements of Section R327, and are otherwise constructed in accordance with this code.</li> </ol> <p><b>R327.2.2 Enclosed area below design flood elevation.</b> Enclosed areas, including crawl spaces, that are below the design flood elevation shall:</p> <ol style="list-style-type: none"> <li>Be used solely for parking of vehicles, building access or storage.</li> <li>Be provided with flood openings which shall meet the following criteria:           <ol style="list-style-type: none"> <li>There shall be a minimum of two openings on different sides of each enclosed area; if a building has more than one enclosed area below the design flood elevation, each area shall have openings on exterior walls.</li> <li>The total net area of all openings shall be at least 1 square inch for each square foot (275 mm for each square meter) of enclosed area.</li> <li>The bottom of each opening shall be 1 foot (305 mm) or less above the adjacent ground level.</li> <li>Openings shall be at least 3 inches (76 mm) in diameter.</li> <li>Any louvers, screens or other opening covers shall allow the automatic flow of floodwaters into and out of the enclosed area.</li> <li>Openings installed in doors and windows that meet requirements 2.1 through 2.5, are acceptable; however, doors and windows without installed openings do not meet the requirements of this section.</li> </ol> </li> </ol> <p><b>R408.6 [Under-Floor Space] Flood resistance.</b> For buildings located in areas prone to flooding as established in Table R301.2(1), the walls enclosing the underfloor space shall be provided with flood openings in accordance with Section R327.2.2.</p>

## Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IRC™ .

NFIP Regulations	IRC™ 2000
<b>22</b> (6) Require that manufactured homes that are placed or substantially improved within Zones A1-30, AH, and AE on the community's FIRM on sites (i) Outside of a manufactured home park or subdivision; (ii) In a new manufactured home park or subdivision; (iii) In an expansion to an existing manufactured home park or subdivision, or (iv) In an existing manufactured home park or subdivision on which a manufactured home has incurred "substantial damage" as the result of a flood, be elevated on a permanent foundation such that the lowest floor of the manufactured home is elevated to or above the base flood elevation and be securely anchored to an adequately anchored foundation system to resist flotation collapse and lateral movement.	R105.3.1.1 Substantially improved or substantially damaged existing buildings. SEE BLOCK 4 R327.1.8 Manufactured housing. SEE BLOCK 16 <b>Appendix E Manufactured Housing, Section AE101, Exception SEE BLOCK 4</b>
<b>23</b> (7) Require within any AO zone on the community's FIRM that all new construction and substantial improvements of residential structures have the lowest floor (including basement) elevated above the highest adjacent grade at least as high as the depth number specified in feet on the community's FIRM (at least two feet if no depth number is specified);	R105.3.1.1 Substantially improved or substantially damaged existing buildings. SEE BLOCK 4 R327.2.1 [Flood hazard areas (including A Zones)] Elevation requirements. SEE BLOCK 18
<b>24</b> (8) Require within any AO zone on the community's FIRM that all new construction and substantial improvements of nonresidential structures (i) have the lowest floor (including basement) elevated above the highest adjacent grade at least as high as the depth number specified in feet on the community's FIRM (at least two feet if no depth number is specified), or (ii) together with attendant utility and sanitary facilities be completely floodproofed to that level to meet the floodproofing standard specified in Sec. 60.3(c)(3)(ii);	[NFIP requirement 60.3(c)(8) applies to non-residential construction, see IBC®.]
<b>25</b> (9) Require within any A99 zones on a community's FIRM the standards of paragraphs (a)(1) through (a)(4)(i) and (b)(5) through (b)(9) of this section;	R105.3.1.1 Substantially improved or substantially damaged existing buildings. SEE BLOCK 4 R327.2.1 [Flood hazard areas (including A Zones)] Elevation requirements. SEE BLOCK 18

## Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IRC™ .

NFIP Regulations	IRC™ 2000
<b>26</b> (10) Require until a regulatory floodway is designated, that no new construction, substantial improvements, or other development (including fill) shall be permitted within Zones A1-30 and AE on the community's FIRM, unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point within the community.	R106.1.3 Information for construction in areas prone to flooding. SEE BLOCK 4
<b>27</b> (11) Require within Zones AH and AO, adequate drainage paths around structures on slopes, to guide floodwaters around and away from proposed structures.	<b>R401.3 [Foundations] Drainage.</b> Surface drainage shall be diverted to a storm sewer connection or other approved point of collection so as to not create a hazard. Lots shall be graded so as to drain surface water away from foundation walls.
<b>28</b> (12) Require that manufactured homes to be placed or substantially improved on sites in an existing manufactured home park or subdivision within Zones A-1-30, AH, and AE on the community's FIRM that are not subject to the provisions of paragraph (c)(6) of this section be elevated so that either (i) The lowest floor of the manufactured home is at or above the base flood elevation, or (ii) The manufactured home chassis is supported by reinforced piers or other foundation elements of at least equivalent strength that are no less than 36 inches in height above grade and be securely anchored to an adequately anchored foundation system to resist floatation, collapse, and lateral movement.	<b>R105.3.1.1 Substantially improved or substantially damaged existing buildings.</b> SEE BLOCK 4 <b>R327.1.8 Manufactured housing.</b> SEE BLOCK 16 <b>Appendix E Manufactured Housing, Section AE101.1 General. Exception.</b> SEE BLOCK 4
<b>29</b> (13) Notwithstanding any other provisions of Sec. 60.3, a community may approve certain development in Zones A-30, AE, and AH, on the community's FIRM which increase the water surface elevation of the base flood by more than one foot, provided that the community first applies for a conditional FIRM revision, fulfills the requirements for such a revision as established under the provisions of Sec. 65.12, and receives the approval of the Administrator.	[Not addressed in IRC™ , see IBC® Appendix G.]

## Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IRC™.

NFIP Regulations	IRC™ 2000
<b>30</b> (14) Require that recreational vehicles placed on sites within Zones A1-30, AH, and AE on the community's FIRM either (I) Be on the site for fewer than 180 consecutive days, (II) Be fully licensed and ready for highway use, or (III) Meet the permit requirements of paragraph (b)(1) of this section and the elevation and anchoring requirements for "manufactured homes" in paragraph (c)(6) of this section. A recreational vehicle is ready for highway use if it is on its wheels or jacking system, is attached to the site only by quick disconnect type utilities and security devices, and has no permanently attached additions.  (d) When the Administrator has provided a notice of final base flood elevations within Zones A1-30 and/or AE on the community's FIRM and, if appropriate, has designated AO zones, AH zones, A99 zones, and A zones on the community's FIRM, and has provided data from which the community shall designate its regulatory floodway, the community shall:	<b>R107</b> Temporary structures.
<b>31</b> (1) Meet the requirements of paragraphs (c) (1) through (14) of this section;	<b>R107</b> Temporary structures.  [Prior provisions cumulative.]
<b>32</b> (2) Select and adopt a regulatory floodway based on the principle that the area chosen for the regulatory floodway must be designed to carry the waters of the base flood, without increasing the water surface elevation of that flood more than one foot at any point;	<b>Table R301.2(1) Climatic and Geographic Design Criteria. Flood Hazards.</b> SEE BLOCK 3
<b>33</b> (3) Prohibit encroachments, including fill, new construction, substantial improvements, and other development within the adopted regulatory floodway unless it has been demonstrated through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that the proposed encroachment would not result in any increase in flood levels within the community during the occurrence of the base flood discharge;	<b>R106.1.3 Information for construction in areas prone to flooding.</b> SEE BLOCK 4 <b>R301.2.4 Floodplain construction. Exception.</b> SEE BLOCK 3

## Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IRC™ .

	<b>NFIP Regulations</b>	<b>IRC™ 2000</b>
<b>34</b>	(4) Notwithstanding any other provisions of Sec. 60.3, a community may permit encroachments within the adopted regulatory floodway that would result in an increase in base flood elevations, provided that the community first applies for a conditional FIRM and floodway revision, fulfills the requirements for such revisions as established under the provisions of Sec. 65.12, and receives the approval of the Administrator.	[IRC™ not applicable to floodway construction; refer to IBC®.]
	(e) When the Administrator has provided a notice of final base flood elevations within Zones A1-30 and/or AE on the community's FIRM and, if appropriate, has designated AH zones, AO zones, A99 zones, and A zones on the community's FIRM, and has identified on the community's FIRM coastal high hazard areas by designating Zones V1-30, VE, and/or V, the community shall:	
<b>35</b>	(1) Meet the requirements of paragraphs (c)(1) through (14) of this section;	[Prior provisions cumulative.]
<b>36</b>	(2) Within Zones V1-30, VE, and V on a community's FIRM, (i) obtain the elevation (in relation to mean sea level) of the bottom of the lowest structural member of the lowest floor (excluding pilings and columns) of all new and substantially improved structures, and whether or not such structures contain a basement, and (ii) maintain a record of all such information with the official designated by the community under Sec. 59.22(a)(9)(iii);	<p>R104.7 Department records.</p> <p><b>R105.3.1.1 Substantially improved or substantially damaged existing buildings.</b> SEE BLOCK 4</p> <p><b>R106.1.3 Information for construction in areas prone to flooding.</b> SEE BLOCK 13</p> <p><b>R109.1.3 Floodplain inspections.</b> SEE BLOCK 13</p> <p><b>R327.1.9 As-built elevation certifications.</b> SEE BLOCK 13</p> <p><b>R327.3 Coastal high hazard areas (including V Zones).</b> Areas that have been determined to be subject to wave heights in excess of 3 feet (914 mm) or subject to high velocity wave action or wave-induced erosion shall be designated as coastal high hazard areas. All buildings and structures erected in coastal high hazard areas shall be designated and constructed in accordance with Sections R327.3.1 through R327.3.5.</p> <p><b>R327.3.1 [Coastal flood hazard areas (including V Zones)] Elevation requirements.</b></p> <ul style="list-style-type: none"> <li>1. All buildings and structures erected within coastal high hazard areas shall be elevated so that the lowest portion of all structural members supporting the lowest floor, with the exception of mat or raft foundations, piling, pile caps, columns, grade beams and bracing, is located at or above the design flood elevation.</li> <li>2. Basement floors that are below grade on all sides are prohibited.</li> <li>3. The use of fill for structural support is prohibited.</li> <li>4. The placement of fill beneath buildings and structures is prohibited.</li> </ul> <p><b>Exception:</b> Walls and partitions enclosing areas below the design flood elevation shall meet the requirements of Sections R327.3.3 and R327.3.4.</p>
<b>37</b>	(3) Provide that all new construction within Zones V1-30, VE, and V on the community's FIRM is located landward of the reach of mean high tide;	[See IBC® Appendix G.]

## Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IRC™ .

NFIP Regulations	IRC™ 2000
<p><b>38</b></p> <p>(4) Provide that all new construction and substantial improvements in Zones V1-30 and VE, and also Zone V if base flood elevation data is available, on the community's FIRM, are elevated on pilings and columns so that</p> <p>(i) the bottom of the lowest horizontal structural member of the lowest floor (excluding the pilings or columns) is elevated to or above the base flood level; and</p> <p>(ii) the pile or column foundation and structure attached thereto is anchored to resist flotation, collapse and lateral movement due to the effects of wind and water loads acting simultaneously on all building components. Water loading values used shall be those associated with the base flood. Wind loading values used shall be those required by applicable State or local building standards. A registered professional engineer or architect shall develop or review the structural design, specifications and plans for the construction, and shall certify that the design and methods of construction to be used are in accordance with accepted standards of practice for meeting the provisions of paragraphs (e)(4)(I) and (ii) of this section.</p>	<p>R105.3.1.1 <b>Substantially improved or substantially damaged existing buildings.</b> SEE BLOCK 4</p> <p><b>R327.3.1 [Coastal high hazard areas (including V Zones)] Elevation requirements.</b> SEE BLOCK 36</p> <p><b>R327.3.2 Foundations.</b> All buildings and structures erected in coastal high hazard areas shall be supported on pilings or columns and shall be adequately anchored to such pilings or columns. Piling shall have adequate soil penetrations to resist the combined wave and wind loads (lateral and uplift). Water loading values used shall be those associated with the design flood. Wind loading values shall be those required by this code. Pile embedment shall include consideration of decreased resistance capacity caused by scour of soil strata surrounding the piling. Pile systems design and installation shall be certified in accordance with Section R327.3.5. Mat, raft or other foundations that support columns shall not be permitted where soil investigations that are required in accordance with Section R401.4 indicate that soil material under the mat, raft or other foundation is subject to scour or erosion from wave-velocity flow conditions.</p> <p><b>R327.3.5 Design certificate.</b> A registered design professional shall certify that the design and methods of construction to be used meet the applicable criteria of this section.</p>
<p><b>39</b></p> <p>Provide that all new construction and substantial improvements within Zones V1-30, VE, and V on the community's FIRM have the space below the lowest floor either free of obstruction or constructed with non-supporting breakaway walls, open wood lattice-work, or insect screening intended to collapse under wind and water loads without causing collapse, displacement, or other structural damage to the elevated portion of the building or supporting foundation system. For the purposes of this section, a breakaway wall shall</p> <p><b>continued on next page</b></p>	<p>R105.3.1.1 <b>Substantially improved or substantially damaged existing buildings.</b> SEE BLOCK 4</p> <p><b>R327.3.3 Walls below design flood elevation.</b> Walls and partitions are permitted below the elevated floor, provided that such walls and partitions are not part of the structural support of the building or structure and:</p> <ol style="list-style-type: none"> <li>Are constructed with insect screening or open lattice.</li> <li>Designed to break away or collapse without causing collapse, displacement or other structural damage to the elevated portion of the building or supporting foundation system. Such walls, framing and connections shall have a design safe loading resistance of not less than 10 pounds per square foot (<math>0.48 \text{ kN/m}^2</math>) and no more than 20 pounds per square foot (<math>0.96 \text{ kN/m}^2</math>); or</li> <li>Where wind loading values of this code exceed 20 pounds per square foot (<math>0.96 \text{ kN/m}^2</math>), a registered design professional shall certify the following:</li> </ol>

## Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IRC™ .

<b>NFIP Regulations</b>	<b>IRC™ 2000</b>
<p><b>39</b> have a design safe loading resistance of not less than 10 and no more than 20 pounds per square foot. Use of breakaway walls which exceed a design safe loading resistance of 20 pounds per square foot (either by design or when so required by local or State codes) may be permitted only if a registered professional engineer or architect certifies that the designs proposed meet the following conditions:</p> <ul style="list-style-type: none"> <li>(i) Breakaway wall collapse shall result from a water load less than that which would occur during the base flood; and,</li> <li>(ii) The elevated portion of the building and supporting foundation system shall not be subject to collapse, displacement, or other structural damage due to the effects of wind and water loads acting simultaneously on all building components (structural and non-structural). Water loading values used shall be those associated with the base flood. Wind loading values used shall be those required by applicable State or local building standards. Such enclosed space shall be useable solely for parking of vehicles, building access, or storage.</li> </ul>	<p>3.1 Collapse of walls and partitions below the design flood elevation shall result from a water load less than that which would occur during the design flood.</p> <p>3.2. The elevated portion of the building and supporting foundation system shall not be subject to collapse, displacement, or other structural damage due to the effects of wind and flood loads acting simultaneously on all building components (structural and non-structural). Water loading values used shall be those associated with the design flood. Wind loading values used shall be those required by this code.</p> <p><b>R327.3.4 Enclosed areas below design flood elevation.</b> Enclosed areas below the design flood elevation shall be used solely for parking of vehicles, building access or storage.</p>
<p><b>40</b></p>	<p>(6) Prohibit the use of fill for structural support of buildings within Zones V1-30, VE, and V on the community's FIRM;</p>
<p><b>41</b></p>	<p>(7) Prohibit man-made alteration of sand dunes and mangrove stands within Zones V1-30, VE, and V on the community's FIRM which would increase potential flood damage.</p>

**R327.3.1(3) and (4) [Coastal flood hazard areas (including V zones)] Elevation requirements. SEE BLOCK 36**

[See IBC® Appendix G.]

**Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IRC™ .**

<b>NFIP Regulations</b>	<b>IRC™ 2000</b>
<b>42</b>	<p>(8) Require that manufactured homes placed or substantially improved within Zones V1-30, V, and VE on the community's FIRM on sites (i) Outside of a manufactured home park or subdivision, (ii) In a new manufactured home park or subdivision, (iii) In an expansion to an existing manufactured home park or subdivision, or (iv) In an existing manufactured home park or subdivision on which a manufactured home has incurred "substantial damage" as the result of a flood, meet the standards on paragraphs (e)(2) through (7) of this section and that manufactured homes placed or substantially improved on other sites in an existing manufactured home park or subdivision within Zones V1-30, V, and VE on the community's FIRM meet the requirements of paragraph (c)(12) of this section.</p>
<b>43</b>	<p>(9) Require that recreational vehicles placed on sites within Zones V1-30, V, and VE on the community's FIRM either (i) Be on the site for fewer than 180 consecutive days, (ii) Be fully licensed and ready for highway use, or (iii) Meet the requirements in paragraphs (b)(1) and (e) (2) through (7) of this section. A recreational vehicle is ready for highway use if it is on its wheels or jacking system, is attached to the site only by quick disconnect type utilities and security devices, and has no permanently attached additions.</p>
<b>Sec. 60.6 Variance and exceptions</b>	<b>R107 Temporary structures.</b>
<b>44</b> <b>continued on next page</b>	<p>(a) The Administrator does not set forth absolute criteria for granting variances from the criteria set forth in Secs. 60.3, 60.4, and 60.5. The issuance of a variance is for flood plain management purposes only. Insurance premium rates are determined by statute according to actuarial risk and will not be modified by the granting of a variance. The community, after examining the applicant's hardships, shall approve or disapprove a request.</p>
	<p><b>R104-10.1 [Modifications] Areas prone to flooding.</b> The building official shall not grant modifications to any provision related to flood hazard areas as established by Table R301.2(1) without the granting of a variance to such provisions by the board of appeals.</p>

**Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IRC™ .**

NFIP Regulations		IRC™ 2000
<b>44</b> <small>continued from previous page</small>	While the granting of variances generally is limited to a lot size less than one-half acre (as set forth in paragraph (a)(2) of this section), deviations from that limitation may occur. However, as the lot size increases beyond one-half acre, the technical justification required for issuing a variance increases. The Administrator may review a community's findings justifying the granting of variances, and if that review indicates a pattern inconsistent with the objectives of sound flood plain management, the Administrator may take appropriate action under Sec. 59.24(b) of this subchapter.	R112.2.1 <b>Determination of substantial improvement in areas prone to flooding.</b> When the building official provides a finding required in Section R105.3.1.1, the board of appeals shall determine whether the value of the proposed work constitutes a substantial improvement. A substantial improvement means any repair, reconstruction, rehabilitation, addition, or improvement of a building or structure, the cost of which equals or exceeds 50 percent of the market value of the building or structure before the improvement or repair is started. If the building or structure has sustained substantial damage, all repairs are considered substantial improvement regardless of the actual repair work performed. The term does not include: <ol style="list-style-type: none"> <li>1. Improvements of a building or structure required to correct existing health, sanitary, or safety code violations identified by the building official and which are the minimum necessary to assure safe living conditions; or</li> <li>2. Any alteration of a historic building or structure provided that the alteration will not preclude the continued designation as a historic building or structure.</li> </ol>
<b>45</b>	Variances may be issued for the repair or rehabilitation of historic structures upon a determination that the proposed repair or rehabilitation will not preclude the structure's continued designation as a historic structure and the variance is the minimum necessary to preserve the historic character and design of the structure.	R301.2.4 <b>Floodplain construction. Exception.</b> [Floodway approvals not allowed, refer to IBC® J SEE BLOCK 3
<b>46</b>	Procedures for the granting of variances by a community are as follows: (1) Variances shall not be issued by a community within any designated regulatory floodway if any increase in flood levels during the base flood discharge would result;	

## Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IRC™ .

	NFIP Regulations	IRC™ 2000
<b>47</b>	<p>(2) Variances may be issued by a community for new construction and substantial improvements to be erected on a lot of one-half acre or less in size contiguous to and surrounded by lots with existing structures constructed below the base flood level, in conformance with the procedures of paragraphs (a) (3), (4), (5) and (6) of this section;</p>	<p><b>R112.2.2 Criteria for issuance of a variance for areas prone to flooding.</b> A variance shall only be issued upon:</p> <ol style="list-style-type: none"> <li>1. A showing of good and sufficient cause that the unique characteristics of the size, configuration, or topography of the site render the elevation standards of Section 327 inappropriate.</li> <li>2. A determination that failure to grant the variance would result in exceptional hardship by rendering the lot undevelopable.</li> <li>3. A determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, extraordinary public expense, nor create nuisances, cause fraud on or victimization of the public, or conflict with existing laws or ordinances.</li> <li>4. A determination that the variance is the minimum necessary to afford relief, considering the flood hazard.</li> <li>5. Submission to the applicant of written notice specifying the difference between the design flood elevation and the elevation to which the building is to be built, stating that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced floor elevation, and stating that construction below the design flood elevation increases risks to life and property.</li> </ol>
<b>48</b>	<p>(3) Variances shall only be issued by a community upon</p> <ol style="list-style-type: none"> <li>(i) a showing of good and sufficient cause,</li> <li>(ii) a determination that failure to grant the variance would result in exceptional hardship to the applicant, and</li> <li>(iii) a determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, extraordinary public expense, create nuisances, cause fraud on or victimization of the public, or conflict with existing local laws or ordinances;</li> </ol>	<p><b>R112.2.2(2) and (3) Criteria for issuance of a variance for areas prone to flooding. SEE BLOCK 47</b></p>
<b>49</b>	<p>(4) Variances shall only be issued upon a determination that the variance is the minimum necessary, considering the flood hazard, to afford relief;</p>	<p><b>R112.2.2(4) Criteria for issuance of a variance for areas prone to flooding. SEE BLOCK 47</b></p>

**Crosswalk of the NFIP Regulations to the Flood Resistance Provisions of the IRC™ .**

<b>NFIP Regulations</b>	<b>IRC™ 2000</b>
<b>50</b>	<p>(4) A community shall notify the applicant in writing over the signature of a community official that</p> <p>(i) the issuance of a variance to construct a structure below the base flood level will result in increased premium rates for flood insurance up to amounts as high as \$25 for \$100 of insurance coverage and</p> <p>(ii) such construction below the base flood level increases risks to life and property. Such notification shall be maintained with a record of all variance actions as required in paragraph (a)(6) of this section; and</p>
<b>51</b>	<p>(6) A community shall (i) maintain a record of all variance actions, including justification for their issuance, and (ii) report such variances issued in its annual or biennial report submitted to the Administrator.</p>
<b>52</b>	<p>(7) Variances may be issued by a community for new construction and substantial improvements and for other development necessary for the conduct of a functionally dependent use provided that</p> <p>(i) the criteria of paragraphs (a)(1) through (a)(4) of this section are met, and</p> <p>(ii) the structure or other development is protected by methods that minimize flood damages during the base flood and create no additional threats to public safety.</p>

R104.7 Department Records.  
R112.2(5) Criteria for issuance of a variance for areas prone to flooding. SEE BLOCK 47

R104.7 Department Records.  
R112.1 [Board of Appeals] General.

[Functionally dependent uses are non-residential uses; refer to IBC®.]

# **Appendix D. FEMA's Regional Offices and NFIP State Coordinators**

## **FEMA's Regional Offices**

### **FEMA HEADQUARTERS**

Office of the Associate Director for  
Mitigation  
500 C Street, S.W.  
Washington, DC 20472  
(202) 646-4622

### **REGION I – CT, MA, ME, NH, RI, VT**

Mitigation Division  
442 J. W. McCormick POCH  
Boston, MA 02109-4595  
(617) 223-9561

### **REGION II – NJ, NY, PR, VI**

Mitigation Division  
26 Federal Plaza, Room 1337  
New York, NY 10278-0002  
(212) 225-7200

### **REGION III – DE, DC, MD, PA, VA, WV**

Mitigation Division  
615 Chestnut Street, Sixth Floor  
Philadelphia, PA 19106  
(215) 931-5502

### **REGION IV – AL, FL, GA, KY, MS, NC, SC, TN**

Mitigation Division  
3003 Chamblee-Tucker Road, Rm 270  
Atlanta, GA 30341  
(770) 220-5400

### **REGION V – IL, IN, MI, MN, OH, WI**

Mitigation Division  
536 S. Clark Street, 6th Floor  
Chicago, IL 60605-1521  
(312) 408-5200

### **REGION VI – AR, LA, NM, OK, TX**

Mitigation Division  
Federal Regional Center  
800 North Loop 288  
Denton, TX 76201-3698  
(940) 898-5165

### **REGION VII – IA, KS, MO, NE**

Mitigation Division  
2323 Grand Boulevard  
Kansas City, MO 64108-2760  
(816) 283-7002

### **REGION VIII – CO, MT, ND, SD, UT, WY**

Mitigation Division  
Denver Federal Center  
Building 710, Box 25267  
Denver, CO 80225-0267  
(303) 235-4830

### **REGION IX – AZ, CA, GU, HI, NV**

Mitigation Division  
Presidio of San Francisco  
Building 105  
San Francisco, CA 94129-1250  
(415) 923-7175

### **REGION X – AK, ID, OR, WA**

Mitigation Division  
Federal Regional Center  
130 228th Street, SW.  
Bothell, WA 98021-9796  
(425) 487-4678

## NFIP State Coordinators

### ALABAMA

Alabama Emergency Management Agency  
NFIP State Coordinator  
5898 Country Road  
P.O. Drawer 2160  
Clanton, AL 35046-2160  
Phone (205) 280-2241 ■ fax (205)  
280-2493

### ALASKA

Alaska Department of Community & Economic Development  
NFIP State Coordinator  
550 W. 7th Avenue, Suite 1770  
Anchorage, AK 99501-3510  
(907) 269-4567 ■ fax (907) 269-4539

### ARIZONA

Arizona Department of Water Resources  
NFIP State Coordinator  
500 N. Third Street, 2nd Floor  
Phoenix, AZ 85004-3903  
(602) 417-2445, ext. 7200  
fax (602) 417-2423

### ARKANSAS

Arkansas Soil & Water Conservation Commission  
NFIP State Coordinator  
101 E. Capitol, Suite 350  
Little Rock, AR 72201  
(501) 682-3907 ■ fax (501) 682-3991

### CALIFORNIA

California Department of Water Resources  
NFIP State Coordinator  
1416 9th Street, Room 1623  
Sacramento, CA 95814  
(916) 653-8089 ■ fax (916) 653-3639

### COLORADO

Colorado Water Conservation Board  
NFIP State Coordinator  
721 State Centennial Building  
1313 Sherman  
Denver, CO 80203  
(303) 866-3441 ■ fax (303) 866-4474

### CONNECTICUT

Connecticut Department of Environmental Protection  
NFIP State Coordinator  
Water Resources Division  
79 Elm Street  
Hartford, CT 06106-5127  
(860) 424-3706 ■ fax (860) 424-4075

### DELAWARE

Delaware Division of Soil and Water  
NFIP State Coordinator  
89 Kings Highway  
Dover, DE 19901  
(302) 739-4411 ■ fax (302) 739-6724

### DISTRICT OF COLUMBIA

District of Columbia Environmental Health Administration  
NFIP State Coordinator  
Watershed Protection Division  
2100 Martin Luther King Avenue, SE  
Room 307  
Washington, DC 20020  
(202) 645-6059, ext. 3052  
fax (202) 645-6063

### FLORIDA

Florida Department of Community Affairs  
NFIP State Coordinator  
2555 Shumard Oak Boulevard  
Tallahassee, FL 32399-2100  
(850) 413-9959 ■ fax (850) 410-1582

**GEORGIA**

Georgia Department of Natural Resources  
NFIP State Coordinator  
7 Martin Luther King, Jr., Drive  
Suite 440  
Atlanta, GA 30334  
(404) 656-3094 ■ fax (404) 657-8535

**HAWAII**

Hawaii Department of Land and Natural Resources  
NFIP State Coordinator  
1151 Punchbowl Street, Room 221  
Honolulu, HI 96813  
(808) 587-0248 ■ fax (808) 587-0283

**IDAHO**

Idaho Department of Water Resources  
NFIP State Coordinator  
1301 N. Orchard  
Boise, ID 83706  
(208) 327-7993 ■ fax (208) 327-7866

**ILLINOIS**

Illinois Department of Natural Resources  
Office of Water Resources  
NFIP State Coordinator  
524 S. 2nd Street  
Springfield, IL 62701-1787  
(217) 782-4435 ■ fax (217) 524-1454

**INDIANA**

Indiana Division of Water  
NFIP State Coordinator  
402 W. Washington Street, Room W264  
Indianapolis, IN 46204  
(317) 232-4164 ■ fax (317) 233-4579

**IOWA**

Iowa Department of Natural Resources  
NFIP State Coordinator  
Wallace State Office Building  
Des Moines, IA 50319  
(515) 281-8942 ■ fax (515) 281-8895

**KANSAS**

Kansas Department of Agriculture  
Division of Water Resources  
NFIP State Coordinator  
901 S. Kansas Avenue, 2nd Floor  
Topeka, KS 66612-1283  
(785) 296-8083 ■ fax (785) 296-1176

**KENTUCKY**

Kentucky Division of Water  
NFIP State Coordinator  
14 Reilly Road  
Frankfort, KY 40601  
(502) 564-3410 ■ fax (502) 564-9003

**LOUISIANA**

Louisiana Department of Transportation & Development  
Floodplain Management Section  
NFIP State Coordinator  
8900 Jimmy Wedell Street, Room 201  
Baton Rouge, LA 70807  
(225) 274-4354 ■ fax (225) 379-1857

**MAINE**

Maine State Planning Office  
NFIP State Coordinator  
38 State House Station  
Augusta, ME 04333-0038  
(207) 287-8063 ■ fax (207) 287-6489

**MARYLAND**

Maryland Department of Environment – TARSA  
NFIP State Coordinator  
2500 Broening Highway  
Baltimore, MD 21224  
(410) 631-4164 ■ fax (410) 631-3873

<b>MASSACHUSETTS</b> Massachusetts Division of Emergency Management Flood Hazard Management Program NFIP State Coordinator 100 Cambridge Street Boston, MA 02202 (617) 727-3267, ext. 514 <i>fax</i> (617) 727-9402	<b>NEBRASKA</b> Nebraska Natural Resources Commission NFIP State Coordinator 301 Centennial Mall South Lincoln, NE 68509-4876 (402) 471-3936 ■ <i>fax</i> (402) 471-3132
<b>MICHIGAN</b> Michigan Department of Environmental Quality NFIP State Coordinator 116 W. Allegan Lansing, MI 48933 (517) 335-3182 ■ <i>fax</i> (517) 373-9965	<b>NEVADA</b> Nevada Division of Water Planning Flood Management Program NFIP State Coordinator 1550 E. College Parkway, Suite 142 Carson City, NV 89704 (775) 687-3600, ext. 23 <i>fax</i> (775) 687-1288
<b>MINNESOTA</b> Minnesota Department of Natural Resources NFIP State Coordinator 500 Lafayette Road St. Paul, MN 55155-4032 (651) 296-0440 ■ <i>fax</i> (651) 296-0445	<b>NEW HAMPSHIRE</b> New Hampshire Office of State Planning NFIP State Coordinator 107 Pleasant Street Concord, NH 03301 (603) 271-2231 ■ <i>fax</i> (603) 225-7341
<b>MISSISSIPPI</b> Mississippi Emergency Management Agency NFIP State Coordinator P.O. Box 4501 Jackson, MS 39296-4501 (601) 960-9973 ■ <i>fax</i> (601) 360-0942	<b>NEW JERSEY</b> New Jersey Department of Environmental Protection Flood Plain Management Section NFIP State Coordinator P.O. Box 419 Trenton, NJ 08625 (609) 292-2296 ■ <i>fax</i> (609) 984-1908
<b>MISSOURI</b> Missouri Emergency Management Agency NFIP State Coordinator P.O. Box 116 Jefferson City, MO 65102 (573) 526-9141 ■ <i>fax</i> 573-526-9198	<b>NEW MEXICO</b> New Mexico Emergency Management Center Emergency Management Planning & Coordination NFIP State Coordinator P.O. Box 1628 Santa Fe, NM 87504-1628 (505) 476-9681 ■ <i>fax</i> (505) 471-5922
<b>MONTANA</b> Montana Dam Safety Program NFIP State Coordinator 48 N. Last Chance Gulch Helena, MT 59620-1601 (406) 444-6654 ■ <i>fax</i> (406) 444-0533	<b>NEW YORK</b> New York State Department of Environmental Conservation NFIP State Coordinator 50 Wolf Road, Room 388 Albany, NY 12233-3507 (518) 457-0833 ■ <i>fax</i> (518) 485-7786

**NORTH CAROLINA**

North Carolina Division of Emergency Management  
NFIP State Coordinator  
116 W. Jones  
Raleigh, NC 27603-1335  
(919) 733-3359 ■ fax (919) 733-5408

**NORTH DAKOTA**

North Dakota State Water Commission  
NFIP State Coordinator  
900 East Boulevard Avenue  
Bismarck, ND 58505-0850  
(701) 328-4898 ■ fax (701) 328-3747

**OHIO**

Ohio Department of Natural Resources  
Division of Water  
NFIP State Coordinator  
1939 Fountain Square  
Columbus, OH 43224  
(614) 265-6750 ■ fax (614) 447-9503

**OKLAHOMA**

Oklahoma Water Resources Board  
NFIP State Coordinator  
3800 N. Classen Boulevard  
Oklahoma City, OK 73118  
(405) 530-8800 ■ fax (405) 530-8900

**OREGON**

Oregon Department of Land  
Conservation & Development  
NFIP State Coordinator  
635 Capitol Street, NE, Suite 200  
Salem, OR 97301-2540  
(503) 373-0050, ext. 255  
fax (503) 378-6033

**PENNSYLVANIA**

Pennsylvania Department of Community and  
Economic Development  
Floodplain Management Division  
NFIP State Coordinator  
313 Forum Building  
Harrisburg, PA 17120  
(717) 720-7445 ■ fax (717) 234-4560

**PUERTO RICO**

Puerto Rico Planning Board  
NFIP Coordinator  
Minillas Government Center  
P.O. Box 41119  
San Juan, PR 00940-9985  
(787) 727-4444 ■ fax (787) 724-3270

**RHODE ISLAND**

Rhode Island Emergency Management  
Agency, MURI  
NFIP State Coordinator  
645 New London Avenue  
Cranston, RI 02920  
(401) 874-6616 ■ fax (401) 789-4670

**SOUTH CAROLINA**

South Carolina Department of Natural  
Resources  
NFIP State Coordinator  
2221 Devine Street, Suite 222  
Columbia, SC 29205  
(803) 734-9120 ■ fax (803) 734-9200

**SOUTH DAKOTA**

South Dakota Division of Emergency  
Management  
NFIP State Coordinator  
500 E. Capitol  
Pierre, SD 57501-5070  
(605) 773-3239 ■ fax (605) 773-3580

**TENNESSEE**

Tennessee Department of Economic &  
Community Development  
NFIP State Coordinator  
320 Sixth Avenue N, 6th Floor  
Nashville, TN 37243-0405  
(615) 741-2211 ■ fax (615) 741-5070

**TEXAS**

Texas Natural Resource Conservation  
Commission  
NFIP State Coordinator  
P.O. Box 13087-MC 160  
Austin, TX 78711-3087  
(512) 239-6135 ■ fax (512) 239-4770

**U.S. VIRGIN ISLANDS**

Virgin Islands Department of Planning  
& Natural Resources  
NFIP Coordinator  
Fosters Plaza  
396-1 Anna's Retreat  
St. Thomas, VI 00802  
(340) 774-3320 ■ fax (340) 774-5706

**UTAH**

Utah Division of Comprehensive  
Emergency Management  
NFIP State Coordinator  
State Office Building, #1110  
Salt Lake City, UT 84114  
(801) 538-3750 ■ fax (801) 538-3770

**VERMONT**

Vermont Department of Environmental  
Conservation  
NFIP State Coordinator  
103 S. Main Street, Building 10N  
Waterbury, VT 05671-0408  
(802) 241-3770 ■ fax (802) 241-3287

**VIRGINIA**

Virginia Department of Conservation  
NFIP State Coordinator  
203 Governor Street, Suite 206  
Richmond, VA 23219  
(804) 371-6135 ■ fax (804) 371-2630

**WASHINGTON**

Washington Department of Ecology  
Land Resources Program  
NFIP State Coordinator  
P.O. Box 47600  
Olympia, WA 98504-7600  
(360) 407-6796 ■ fax (360) 407-6904

**WEST VIRGINIA**

West Virginia Office of Emergency Services  
NFIP State Coordinator  
1900 Kanawha Boulevard, Room EB-80  
Charleston, WV 25305-0360  
(304) 558-5380 ■ fax (304) 344-4538

**WISCONSIN**

Wisconsin Department of Natural Resources  
NFIP State Coordinator  
101 S. Webster  
Madison, WI 53707  
(608) 266-8037 ■ fax (608) 264-9200

**WYOMING**

Wyoming Emergency Management Agency  
NFIP State Coordinator  
5500 Bishop Boulevard  
Cheyenne, WY 82009-3320  
(307) 777-4918 ■ fax (307) 635-6017

## **Appendix E. Sample Plan Review and Inspection Checklists**

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# SAMPLE

Application #: \_\_\_\_\_

Applicant: \_\_\_\_\_

## Plan Review Checklist

### FLOOD HAZARD AREA APPLICATION REVIEW – A ZONES

Terms: FHA = Flood Hazard Area; DFE = Design Flood Elevation

Reviewer's Initials and Date of Review	Review Steps <i>NOTE: For variance requests, use this form to document efforts to achieve the greatest degree of compliance.</i>
	<p>Is proposed development consistent with zoning?</p> <p><input type="checkbox"/> NO, has a zoning amendment been requested?</p> <p><input type="checkbox"/> YES, proceed with review.</p>
FIRM Panel # and date _____	<p>Check FIRM, floodplain/floodway boundaries, base flood elevations, and map revisions or LOMRs issued by FEMA. Is proposal in the floodplain and/or floodway?</p> <p><input type="checkbox"/> NO, sign and date this form and put in file.</p> <p><input type="checkbox"/> YES, must meet the flood resistant provisions of the code.</p>
FLOODWAY Panel # and date _____	<p><input type="checkbox"/> YES, FLOODWAY. All residential structures (including Manufactured Housing units) in floodways to comply with IBC®.</p>
DFE _____	<p><input type="checkbox"/> YES, FLOODWAY. Require engineer's "no rise" certification and supporting hydraulic data in file before continuing review.</p> <p><input type="checkbox"/> YES, in FHA without DFEs. Check other sources, use estimating methods, or require applicant to determine.</p> <p><input type="checkbox"/> YES, in FHA, but applicant has elevation data that shows natural site elevation above DFE. Advise applicant to obtain LOMA and submit copy.</p> <p><input type="checkbox"/> YES, in "Coastal A Zone"; refer to V Zone Checklist if V Zone requirements are to be applied.</p> <p><input type="checkbox"/> YES, in 500-year floodplain. Floodplain review not required.</p>
	<p>Site plan shows nature of development proposal, location, dimensions, wetlands, floodplain/floodway boundaries, and ground elevations.</p> <p><input type="checkbox"/> YES, continue review.</p> <p><input type="checkbox"/> NO, return to applicant to revise application and site plan.</p>
	<p>Can the proposed development be modified to avoid floodplain?</p> <p><input type="checkbox"/> YES. Explain flood hazards to applicant and make recommendations to minimize flood hazards and damage.</p> <p><input type="checkbox"/> NO, but can impacts be further minimized? Can fill be minimized? Buildings moved to higher ground?</p>
	<p>Has the applicant obtained and provided copies of all necessary State and federal permits, e.g., wetlands?</p> <p><input type="checkbox"/> NO, advise applicant which agencies to contact.</p> <p><input type="checkbox"/> YES, require copies in file.</p>
	<p>Will a watercourse be altered?</p> <p><input type="checkbox"/> NO. Continue review.</p> <p><input type="checkbox"/> YES. Applicant to provide copies of notices to adjacent communities, federal agencies, and the NFIP State Coordinator.</p> <p><input type="checkbox"/> YES. Engineer's analysis required to show same flood carrying capacity; method of maintenance specified.</p>
	<p>Is fill proposed? Will fill be compacted? Side-slopes are no steeper than 2:1? Protected from erosion?</p> <p><input type="checkbox"/> NO fill. Continue review.</p> <p><input type="checkbox"/> YES, fill used to elevate building will be compacted, sloped, and stabilized.</p> <p><input type="checkbox"/> YES, but not for building elevation. Purpose: _____</p>

# SAMPLE

Application #: \_\_\_\_\_

## Plan Review Checklist

### FLOOD HAZARD AREA APPLICATION REVIEW – A ZONES

Initials and Date	Review Steps
	<p>Is the application for improvement or addition to an existing building?</p> <p><input type="checkbox"/> NO. A new structure is proposed, continue review.</p> <p><input type="checkbox"/> YES, but building is documented in file as a "historic structure" and proposed work will not change historic designation. Encourage flood resistance.</p> <p><input type="checkbox"/> YES. Costs of work are documented and compared to market value.</p> <p><input type="checkbox"/> If costs equal or exceed 50% of market value of structure, provide finding to Board of Appeals for determination of Substantial Improvement.</p> <p><input type="checkbox"/> Proposed work is not a Substantial Improvement. Flood hazard review not required.</p>
	<p>Are new structures proposed to be elevated (new residential or non-residential buildings, tanks, manufactured homes)? Give applicant a blank Elevation Certificate.</p> <p><input type="checkbox"/> NO. STOP! A permit cannot be issued for non-elevated residential buildings.</p> <p><input type="checkbox"/> NO. Non-residential may be floodproofed (see certification requirements)</p> <p><input type="checkbox"/> YES, on fill. Basements in fill are <u>not</u> allowed.</p> <p><input type="checkbox"/> YES, on piers, pilings, or columns.</p> <p><input type="checkbox"/> YES, on solid foundation walls (see about Enclosures below DFE).</p>
	<p>Check the following for Manufactured Housing units:</p> <p><input type="checkbox"/> Are flood hazards avoided as much as possible?</p> <p><input type="checkbox"/> In Floodway, refer to IBC® for foundation design.</p> <p><input type="checkbox"/> Foundation is reinforced (dry-stack block NOT allowed).</p> <p><input type="checkbox"/> Ground anchors and tie-downs shown on plans?</p> <p><input type="checkbox"/> Elevated above the DFE?</p>
	<p>Check the following for utility support systems:</p> <p><input type="checkbox"/> Electrical, mechanical, plumbing, heating/air conditioning components elevated?</p> <p><input type="checkbox"/> Septic designed to minimize inflow/discharge under flood conditions?</p> <p><input type="checkbox"/> On-site water supply designed to minimize inflow under flood conditions?</p> <p><input type="checkbox"/> Above-ground tanks are anchored/elevated?</p> <p><input type="checkbox"/> Below-ground tanks are designed to resist flotation?</p>
	<p>If new, non-residential structure is not elevated, will it be floodproofed?</p> <p><input type="checkbox"/> YES, non-residential building will be floodproofed to not less than 1' above DFE, and Floodproofing Certification of design is in file.</p> <p><input type="checkbox"/> YES, agricultural building to be wet floodproofed.</p> <p><input type="checkbox"/> NO. Permit shall not be approved.</p>
	<p>Enclosed areas below DFE (stairwells, sheds, garages, storage areas, crawl spaces)?</p> <p><input type="checkbox"/> NO. Continue review.</p> <p><input type="checkbox"/> YES, number, size, and location of vents shown on plan.</p> <p><input type="checkbox"/> YES, plan shows acceptable use (parking, limited storage, and access).</p> <p><input type="checkbox"/> YES, flood resistant materials specified.</p> <p><input type="checkbox"/> YES, utilities, if any, are all elevated above DFE.</p>
	<p><input type="checkbox"/> Record permit in log of floodplain permits.</p> <p><input type="checkbox"/> Make sure that all necessary documents are in the file.</p> <p><input type="checkbox"/> Issue Permit and transfer file to Inspections.</p>

PERMIT APPLICATION REVIEW COMPLETED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

ISSUE PERMIT approved by: \_\_\_\_\_

DENY PERMIT approved by: \_\_\_\_\_

# SAMPLE

Permit #: \_\_\_\_\_

Date: \_\_\_\_\_

Applicant: \_\_\_\_\_

## Inspection Checklist

### FLOOD HAZARD AREA INSPECTIONS – A ZONES

Inspector's Initials and Date of Inspection	Inspection Steps
	Before site inspection: <input type="checkbox"/> REVIEW permit file before going in the field. <input type="checkbox"/> ASK permit reviewer questions to understand requirements. <input type="checkbox"/> Are other State and federal permits in the file?
	Measure stake out distances from waterway or landmark. Is development in the right place? Is fill correct distance from waterway or landmark? <input type="checkbox"/> NO. Take enforcement action to correct problems. <input type="checkbox"/> YES. Check fill compaction and side slopes. No basements in fill.
	Elevation of lowest floor checked during framing or foundation inspection after lowest floor is in place. Elevations checked and acceptable? <input type="checkbox"/> YES. <input type="checkbox"/> NO! Take enforcement action to correct problems.
	For enclosures below DFE (including crawl spaces): Are flood damage resistant materials used? Does use of enclosure appear to be limited to crawl space, parking, building access, or limited storage? Are flood openings no more than 12" above grade? Are there enough flood openings, are they on at least two sides, and do they allow automatic entry/exit of floodwater? <input type="checkbox"/> YES. <input type="checkbox"/> Building does not have enclosures below DFE. <input type="checkbox"/> NO! Take enforcement action to correct problems.
	Other Notes Based on Inspection:
	Issue Occupancy Certificate only if final inspection shows compliance with floodplain requirements.

FINAL INSPECTION COMPLETED BY: \_\_\_\_\_ DATE: \_\_\_\_\_



# SAMPLE

Application #: \_\_\_\_\_

Applicant: \_\_\_\_\_

## Plan Review Checklist

### FLOOD HAZARD AREA APPLICATION REVIEW – V ZONES

Terms: FHA = Flood Hazard Area; DFE = Design Flood Elevation

Reviewer's Initials and Date of Review	Review Steps <i>NOTE: For variance requests, use this form to document efforts to achieve the greatest degree of compliance.</i>
	Is proposed development consistent with zoning? <input type="checkbox"/> NO, has a zoning amendment been requested? <input type="checkbox"/> YES, proceed with review.
	Is proposal in Coastal Barrier Resources Area (CoBRA) or Otherwise Protected Area? <input type="checkbox"/> NO, continue review. <input type="checkbox"/> YES, advise applicant that flood insurance is not available, document to file, continue review (must comply with flood provisions).
FIRM Panel # and date <hr/> DFE _____	Check FIRM, floodplain and zone boundaries, base flood elevations, <u>and</u> map revisions or LOMRs issued by FEMA. Is proposal in the Coastal Flood Hazard Area subject to high velocity wave action (V Zone)? <input type="checkbox"/> NO, not in Flood Hazard Area; sign and date this form and put in file. <input type="checkbox"/> NO, in "Coastal A Zone" (apply V Zone requirements if specified in ordinance). <input type="checkbox"/> NO, in riverine A Zone. Use A Zone checklist. <input type="checkbox"/> YES, in V Zone, must meet flood resistant provisions of the code.
	Site plan shows development proposal, location, dimensions, wetlands, FHA / V Zone boundaries, DFE, and ground elevations (NGVD or other datum on FIRM). <input type="checkbox"/> YES, continue review. <input type="checkbox"/> NO, return to applicant to revise application and site plan.
	Can the proposed development be modified to avoid FHA / V Zone? <input type="checkbox"/> YES. Explain flood hazards to applicant and make recommendations to minimize flood hazards and damage. <input type="checkbox"/> NO. Can floodplain impacts be further minimized? Maximize setback from the water? Buildings moved to higher elevation?
	Has the applicant obtained and provided copies of all necessary State and federal permits, e.g., wetlands, coastal zone consistency? <input type="checkbox"/> NO, advise applicant which agencies to contact. <input type="checkbox"/> YES, require copies in file.
	Will a dune be altered? <input type="checkbox"/> NO, continue review. <input type="checkbox"/> YES. Require State coastal zone approval before continuing.
	Is a pool proposed? <input type="checkbox"/> NO. Continue review. <input type="checkbox"/> YES, not attached to the building; continue review. <input type="checkbox"/> YES, attached to the building. Applicant to redesign. Do not continue review.

# SAMPLE

Application #: \_\_\_\_\_

## Plan Review Checklist

### FLOOD HAZARD AREA APPLICATION REVIEW – V ZONES

Initials and Date	Review Steps
	Is the application for improvement or addition to an existing building? <input type="checkbox"/> NO. A new structure is proposed, continue review. <input type="checkbox"/> YES, but building is documented in file as a "historic structure" and proposed work will not change historic designation. Encourage flood resistance. <input type="checkbox"/> YES. Costs of improvements are documented and compared to market value. <input type="checkbox"/> If costs of proposed addition equal or exceed 50% of market value of structure, provide finding to Board of Appeals for determination of Substantial Improvement. <input type="checkbox"/> Proposed work is not a Substantial Improvement. Flood hazard review not required.
	Are new buildings proposed to be elevated? Give applicant a blank Elevation Certificate. <input type="checkbox"/> NO. STOP! A permit cannot be issued for non-elevated buildings. <input type="checkbox"/> YES, on piers, pilings, or columns. <input type="checkbox"/> YES, on parallel shear walls (parallel to expected direction of flow?). <input type="checkbox"/> YES, design certification submitted?
	Check the following for utility support systems: <input type="checkbox"/> Electrical, mechanical, plumbing, heating/air conditioning components elevated? <input type="checkbox"/> Septic designed to minimize inflow/discharge under flood conditions? <input type="checkbox"/> On-site water supply designed to minimize inflow under flood conditions? <input type="checkbox"/> Above-ground tanks are anchored/elevated? <input type="checkbox"/> Below-ground tanks are designed to resist flotation?
	Enclosed area below DFE proposed (stairwells, sheds, garages, storage areas)? <input type="checkbox"/> NO. Continue review. <input type="checkbox"/> YES, enclosed by insect screening or lattice. Continue review. <input type="checkbox"/> YES, applicant has provided certification of breakaway wall design. <input type="checkbox"/> YES, design not certified. Advise applicant to obtain certification of breakaway wall design from registered design professional. <input type="checkbox"/> YES, flood resistant materials will be used. <input type="checkbox"/> YES, utilities <u>not</u> penetrating or attached to breakaway walls.
	<input type="checkbox"/> Record permit in log of floodplain permits. <input type="checkbox"/> Make sure that all necessary documents are in the file. <input type="checkbox"/> Issue Permit and transfer file to Inspections.

PERMIT APPLICATION REVIEW COMPLETED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

- ISSUE PERMIT approved by: \_\_\_\_\_
- DENY PERMIT approved by: \_\_\_\_\_

# SAMPLE

Permit #: \_\_\_\_\_

Date: \_\_\_\_\_

Applicant: \_\_\_\_\_

## Inspection Checklist

### FLOOD HAZARD AREA INSPECTIONS – V ZONES

Inspector's Initials and Date of Inspection	Inspection Steps
	Before site inspection: <input type="checkbox"/> REVIEW permit file before going in the field. <input type="checkbox"/> ASK permit reviewer questions to understand requirements. <input type="checkbox"/> Are other State and federal permits in the file?
	Measure distances from water or landmark. Is development in the right place? <input type="checkbox"/> NO. Take enforcement action to correct problems. <input type="checkbox"/> YES. Continue inspection.
	Elevation of lowest floor checked during framing or foundation inspection after lowest floor is in place. Elevations checked and acceptable? <input type="checkbox"/> YES. <input type="checkbox"/> NO! Take enforcement action to correct problems.
	For enclosures below DFE: Are walls insect screening or lattice? Are walls breakaway? Are flood damage resistant materials used? Does use of enclosure appear to be limited to parking, building access, or limited storage? <input type="checkbox"/> YES. <input type="checkbox"/> Building does not have enclosures. <input type="checkbox"/> NO! Take enforcement action to correct problems.
	Other Notes Based on Inspection:
	Issue Occupancy Certificate only if final inspection shows compliance with floodplain requirements.

FINAL INSPECTION COMPLETED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

